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ABSTRACT

A two-part articulation instructional objective guide for drafting (graphic communications) is provided. Part I contains summary information on seven blocks (courses) of instruction. They are as follow: introduction; basic technical drafting; problem solving in graphics; reproduction processes; freehand drawing and sketching; graphics composition; and lettering. Part II includes two sections: section A, mechanical drafting and design; and section B, architectural drafting and design. Topics included in section A are technical drafting (tolerances, dimensions, threads), descriptive geometry, and design drafting (working drawings, motion transfer, printed circuits). Topics in section B include methods of construction, site survey, and construction estimation. Information for the instructional blocks generally includes these elements: list of job tasks, course description, instructional hours, instructional objectives, skills and related technical information to be taught, performance standards, standardized performance test items, and equipment requirements. Also available are the Project Report (CE 019 107), Policy and Procedures Guide (CE 019 108) and Instructional Objectives Guides (CE 019 109 and 111). (JH)

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ED164890

A STATE ARTICULATED INSTRUCTIONAL OBJECTIVES GUIDE

FOR

OCCUPATIONAL EDUCATION PROGRAMS

STATE PILOT MODEL

FOR

DRAFTING (GRAPHIC COMMUNICATIONS)

PART I-BASIC

PART II-SPECIALTY PROGRAMS

SECTION A (MECHANICAL DRAFTING AND DESIGN)
SECTION B (ARCHITECTURAL DRAFTING AND DESIGN)

PREPARED BY

ARTICULATION OF OCCUPATIONAL EDUCATION PROGRAMS
BETWEEN SECONDARY SCHOOLS AND TECHNICAL INSTITUTES/
COMMUNITY COLLEGES PROJECT
c/o JAMES SPRUNT INSTITUTE
P. O. BOX 398, KENANSVILLE, NC 28349

JULY, 1978

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
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A JOINT RESEARCH PROJECT SPONSORED BY
THE NORTH CAROLINA STATE DEPARTMENT OF PUBLIC INSTRUCTION
AND
THE NORTH CAROLINA STATE DEPARTMENT OF COMMUNITY COLLEGES

CE 017 110

FOREWORD

This articulated instructional objectives guide is designed for use as a reference in the articulation of vocational education programs at the high school level with occupational education programs at the community college/technical institute level and to foster competency based instruction and evaluation. It is intended primarily for use by instructors at the post-secondary level and teachers at the secondary level conducting like courses in the same occupational program. The guide considers commonalities in like occupational courses between high school and CC/TI (community colleges/technical institutes) programs in the same occupation and implements three basic concepts.

The commonality exists by virtue of the requirement by law that North Carolina community colleges and technical institutes conduct "Open Door" instruction to include occupational programs. Obviously, such instruction must start from the beginning of the total occupational program, often resulting in duplication of instruction conducted in high school. This fact created the requirement for articulation which, if properly conducted, removes the need for the post-secondary student to repeat occupational instruction successfully completed at the secondary level. Such students usually require only the more advanced occupational instruction not received in their high school.

The three basic concepts involved in occupational program articulation between secondary and post-secondary levels of education are:

1. To ensure that vocational education instruction conducted at the high school level is transferable for credit to the CC/TI in the same occupational program, it is essential that the vocational/occupational education instruction components (courses) content be standardized so as to be identifiable with one or more like components at the CC/TI level.
2. To ensure that the student has acquired sufficient skill in job-task performance to be given post-secondary credit for high school work, the teachers and instructors must both use the same task performance standards.
3. To ensure that student occupational qualification recognized for employment or course credit is both both valid and reliable, it is necessary to standardize test items and procedures in the evaluation of student job-task performance.

Instructional content standardization is based upon job tasks considered necessary for job qualification by the employers. The performance standards standardization is achieved by basing them on the performance standards required by the industry/business/profession for initial job entry qualification. The ability to perform job tasks and meet initial job entry task performance standards recognized and accepted by employers must take precedence over personal opinions regarding standards or articulation cannot be readily accomplished. Test items and evaluation procedures for the same job task should be developed jointly by the instructors and teachers concerned.

ARTICULATION RESEARCH PROJECT

SIGNATORIES TO LOCAL AREA OCCUPATIONAL EDUCATION CURRICULUM ARTICULATION AGREEMENTS

The following listed local area public school system and community college/technical institute administrators have agreed to articulate their Drafting Program of instruction. Such agreements involve the employment of this document as an instructional objectives guide. High school students who successfully complete recognized articulated portions of this program and are evaluated as job qualified in work completed will be given appropriate credit for such work by the local area community college/technical institute.

Cumberland Area:

Howard E. Boudreau	President	Fayetteville Technical Institute Fayetteville, North Carolina
C. Wayne Collier	Superintendent	Cumberland County Public Schools Fayetteville, North Carolina
R. Max Abbott	Superintendent	Fayetteville City Public Schools Fayetteville, North Carolina

Duplin-Sampson Area:

Bruce I. Howell	President	Sampson Technical Institute Clinton, North Carolina
Charles H. Yelverton	Superintendent	Duplin County Public Schools Kenansville, North Carolina

Wayne Area:

Clyde A. Erwin, Jr.	President	Wayne Community College Goldsboro, North Carolina
John K. Wooten, Jr.	Superintendent	Wayne County Public Schools Goldsboro, North Carolina
William R. Johnson	Superintendent	Goldsboro City Public Schools Goldsboro, North Carolina

THE ARTICULATION RESEARCH PROJECT

Background: The Articulation Research Project was initiated on 1 September 1974 as a State Board of Education approved joint effort by the President of James Sprunt Institute and the Superintendent of the Duplin County Public Schools. It was and is supported by the North Carolina Occupational Research Unit, State Department of Public Education with funding provided jointly by the State Departments of Public Instruction and Community Colleges.

The drafting program instructor of James Sprunt Institute and the teachers of Duplin County High Schools, assisted by their occupational craft advisors and acting as a joint committee in 1975 developed the initial instructional objectives guide that was used to help articulate their drafting programs. Sampson Technical Institute assumed the post-secondary drafting program articulation function from James Sprunt Institute in 1976. The Duplin-Sampson revision of the Duplin Area guide was in turn up-dated, revised, and refined by a state level committee in 1977 resulting in this pilot model for an instructional objectives guide that could be used state wide at both levels of education. It is expected that all post-secondary drafting instructors and secondary drafting teachers, in those institutions and school systems that have entered into local area articulation agreements, will utilize this pilot model. A state instructional objectives guide for a drafting program will help to ensure that instructional content and performance standards are the same for common courses of instruction in participating schools. See Item 10, p. iv for program flexibility.

The state level committee that developed the revisions and refinements to the Duplin-Sampson Area Committee produced guide consisted of representatives from each local area joint advisory and program committee for the occupation concerned that is operational in the areas of the state that have entered into local area articulation agreements. Each local area sent both secondary and post-secondary occupational teachers/instructors as representatives for each articulated program, plus at least one advisor for each program, to participate as the state advisory and program committee. Where possible, a state occupational education staff member from both the Department of Public Instruction and the Department of Community Colleges participated in the role of acting executive secretary for each joint state advisory and program committee. This committee acting as a whole performed the actions cited above. The joint state advisory and program committee members participating from the local areas and state staff personnel are listed below:

NORTH CAROLINA JOINT DRAFTING (GRAPHIC COMMUNICATIONS) ADVISORY AND PROGRAM COMMITTEE

Edward Alderman	Consultant	Consultant, T & I Education Division of Occupational Education State Department of Public Instruction
William L. Laslett	Advisor Cumberland Area	Architect-Planner Fayetteville, NC
Ronald L. Mace	Advisor Cumberland Area	Barrior Free Environments, Inc. Fayetteville, NC

Roger Stephens	Advisor Duplin-Sampson Area	Rockwell International Raleigh, NC
James T. Vinson	Advisor Wayne Area	J. T. Vinson, Architect Goldsboro, NC
Robert S. Barden	Teacher Cumberland Area	Cape Fear High School Fayetteville, NC
Charles A. Bell	Instructor Cumberland Area	Fayetteville Technical Institute Fayetteville, NC
Richard Brandt	Teacher Wayne Area	Eastern Wayne High School Goldsboro, NC
George Crawford	Instructor Duplin-Sampson Area	Sampson Technical Institute Clinton, NC
Sanford Johnson	Teacher Wayne Area	Goldsboro High School, East Goldsboro, NC
David Sloop	Teacher Cumberland Area	Douglas Byrd Senior High School Fayetteville, NC
Anthony Turner	Teacher Duplin-Sampson Area	East Duplin High School Beulaville, NC
Edwin Whyte	Instructor Wayne Area	Wayne Community College Goldsboro, NC
Dr. Carlyle P. Woelfer	Project Director, Editor	Articulation Research Project James Sprunt Institute Kenansville, NC

Credits:

Thomasina Williams	Typist	James Sprunt Institute Kenansville, NC
Operator	Offset Press	James Sprunt Institute Kenansville, NC

Part I - 1978 Edition

Is the result of a committee meeting of 18 July 1978. Primary changes resulted in instructional contact hours recommended for each block to provide the high schools time to give instruction in T&I 7563(Y-2) Mechanical or T&I 7563(Y-2) Architectural. Adjustments were also made to CC/TI hour recommendations to accommodate the advanced specialty requirements.

Purpose of Instructional Objectives Guides

Articulated instructional objectives guides are expected to serve the following purposes:

1. Serve as the primary vehicle for the articulation of subject matter in like occupational programs between the high schools and the community colleges/technical institutes, through use by instructors at both levels as a reference in preparing instruction.

2. Provide a listing of the minimum tasks that a worker is expected to perform in the conduct of a specific level job in the occupation of concern.

3. Identify the primary detailed instructional objectives which are based upon the task listing. The tasks are listed in the sequence of complexity, with the least complex tasks being listed first, except where a task must be performed as a prerequisite to performance of another.

4. Identify the skills (process objectives) and related technical information which must be taught and learned to accomplish the instructional objective. These represent the minimum skills and related information required for adequate occupational proficiency in task performance.

5. Designate the instructional contact hours considered necessary to conduct the required instruction. This is an estimate by the instructors of the advisory and program committee as to the time required to teach the average learner to perform the task. This time estimate is based upon the assumption that the instructor will have available the essential equipment, facilities and instructional aids required to conduct the instruction, with the class size limited to the number of students shown on the equipment list.

6. Identify the performance standards to be met for occupational proficiency in the task. Performance standards used are those considered to be minimum business or industry standards. The ability to meet the listed standards of performance will also be considered as qualification for advanced instruction in that occupational program.

7. Provide a guide in the conduct of sequential occupational competency instruction by duties or blocks, resulting in qualification by the learner to perform limited skill specialist jobs of progressively higher skills until the program objective is reached, ie: file clerk to executive secretary; brake technician to automotive mechanic, etc. As the learner becomes proficient in the performance of tasks in successive more complex blocks, more marketable competencies are gained may be identifiable as the lower level job qualifications of a specialist. This provides an opportunity for even the slow student to eventually gain sufficient skills to perform adequately as a specialist at some level in the occupation, despite the lack of ability to complete the program.

The same holds true for the learner who has progressed satisfactorily through "several" initial blocks of occupational instruction (depending upon the program) and then for some valid reason is unable to complete the program or must leave school. Standardized sequences of instructional block presentation also ensure that lateral articulation can be practiced between the high schools of a local area and simplifies vertical articulation of subject matter with the local post-secondary institution.

8. Provide a listing of equipment required to conduct the program of instruction. Equipment listed is that considered to be the type and quantity essential for the conduct of instruction leading to job qualification in the occupation, with the class limited to the size stated. In some cases, expensive items of equipment, that have limited use, can be shared between schools, if adequate transportation and scheduling support is provided by the county school office. In some instances, it may be possible to delay teaching of several tasks involving special equipment and then arrange to take the class to the location of such equipment for instruction.

9. Provide a list of standardized performance test items to be used in the determination of occupational proficiency. The test items listed cannot be easily compromised, as long as the specifics are not provided, and could be used as study guides.

10. It is recognized that there may be unlisted tasks that some employers may require the worker to do in the occupation, when in their employment. The tasks listed are the minimum requirements for qualification for the job under average circumstances on a regional basis. The tasks are not limited to a specific area employment situation or employer. Instructors may teach more skills and related technical information than is shown in the guides. Such information should be limited to the students who have completed the requirements for the tasks concerned in the instructional objectives guide. Normally the change of tasks to those in the guide should be based upon local committee agreed area requirements and be taught by all schools teaching the block of instruction.

11. Updating and correction of items in the instructional objectives guides--teachers/instructors are encourage to view the instructional objectives critically in an effort to ensure that the contents are valid and current with business and industry requirements. Recommendations for change or correction should be submitted to the executive secretary of the committee, who should then assemble and present them to the advisory and program committee as a whole, for review and possible adoption.

12. Instructional Blocks (Duties)--Under normal circumstances, the teacher/instructor should not plan to conduct instruction in a given articulated block of instruction unless the capability exists to conduct all of the instruction to meet the instructional objectives, with the result that the successful learner is occupationally qualified to perform the tasks identified with the block. This of course means that in most cases the high schools will lack the capability to conduct a full program of

instruction conducted by the CC/TI owing to lack of class time, instructional resources or instructor time. The overall philosophy to be applied in occupational programs is that it is better to ensure that the learner is fully qualified to perform all of the tasks in a limited group of blocks or modules in an occupation and may be quaiify at a lower job level, rather than to be only familiar with a large number of duty areas and tasks, but qualified to perform none of them. If higher level job qualification is sought, enrollment at the CC/TI is appropriate.

13. Most occupational programs will contain certain basic blocks of instruction without which a student would not be considered occupationally qualified at any level. Such blocks are normally identified as blocks 0.0 to 1.0 and on occasions blocks 2.0 and 2.5. These blocks usually are base blocks and should be taught early in the program sequence.

14. The instructional objectives guide is also designed to provide the information required to help ensure that the vocational student from high school who enrolls for advanced instruction in the same program at the CC/TI level will receive appropriate credit for articulated occupational course work successfully completed at the secondary education level.

A STATE ARTICULATED INSTRUCTIONAL OBJECTIVES GUIDE

FOR

OCCUPATIONAL EDUCATION PROGRAMS

PROGRAM

DRAFTING (GRAPHIC COMMUNICATIONS)
PART I - BASIC

(A PILOT MODEL)

JULY 1978

PREPARED BY

ARTICULATION OF OCCUPATIONAL EDUCATION PROGRAMS
BETWEEN SECONDARY SCHOOLS AND TECHNICAL INSTITUTES/
COMMUNITY COLLEGES PROJECT
c/o JAMES SPRUNT INSTITUTE
P. O. BOX 398, KENANSVILLE, NC 28349

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Summary Block 2.0 (Problem Solving in Graphics)........................... 2.00

Summary Block 3.0 (Reproduction Processes)................................ 3.00

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ARTICULATION RESEARCH PROJECT
INSTRUCTIONAL GUIDE

Summary

PROGRAM: Drafting (Graphic Communications), Part I (Basic)*

COURSES:
Introduction to Graphics (Drafting) (Block 0.0)
Basic Technical Drafting (Basic Graphic Communications) (Block 1.0)
Problem Solving in Graphics (Block 2.0)
Reproduction Processes (Block 3.0)
Freehand Drawing and Sketching (Block 4.0)
Graphic Composition (Block 5.0)
Lettering (Graphic Communications) (Block 6.0)

*Part I - This is the basic and common instructional portion of a total Drafting (Graphic Communications) Program that leads to qualification in one of several specailties such as architectural drafting, machine drafting or building trades drafting, Commercial Art, etc. Part II contains the advanced specialty instructional requirements and is prepared as a separate document.

CURRENT OFFICIAL COURSE IDENTIFICATIONS CONTAINING PART OF ONE OR MORE OF THE BLOCKS OF INSTRUCTION WHICH COMPRISE THIS PROGRAM:

Department of Public Instruction:

T&I 7551(Y-1) - Technical Drafting I
T&I 7552(Y-2) - Technical Drafting II
T&I 7792(Y-2) - Graphics and Industrial Communications II

Department of Community Colleges:

DFT 101/DFT 1121 - Drafting I
DFT 101/DFT 1122 - Drafting II
DFT 1226 - Graphic Communications
CAT 1120 - Creative Problem Solving
CAT 1111 - Reproduction Processes I
CAT 1100 - Sketching and Drawing
CAT 1109 - Composition
CAT 1126 - Lettering

PROGRAM INSTRUCTIONAL CONTACT HOURS (PART I): High Schools - Total 540**
Community Colleges/Technical Institutes - Totals:
Architectural - 370** and Mechanical - 315**

**This time allocation represents the initial instruction devoted to developing the basic skills in the subject (duty) areas of each block of instruction. Additional instructional time related to each duty area is provided by integration into appropriate blocks of instruction of Part I and in the advanced specialty areas of Part II of this program.

Note: Numbers shown are local institution course numbers.

INSTRUCTIONAL OBJECTIVES (PART I) (BASIC):

Recommended Instructional Hours by Block-HS/CC/TI	Instructional Objectives
Block 0.0 (20 hrs/20 hrs)	To provide the student with: (a) essential occupational and career information related to graphic communications with emphasis upon the general field of drafting; (b) the primary skills required to correctly use basic drafting equipment, construct geometric figures, and apply the draftsman's alphabet of lines.
Block 1.0 (160 hrs/88 hrs)	To provide the student with the required: (a) knowledge about orthographic drawings; (b) skills to draw objects using orthographic, oblique and perspective methods and the axonometric system.
Block 2.0 (90 hrs/44 hrs - Architectural) (90 hrs/44 hrs - Mechanical)	To provide the student with the basic skills and related technical information required to solve occupational (job) problems (with emphasis in the field of graphics) by learning to organize thought processes, how to plan, apply available appropriate resources, and determine requirements.
Block 3.0 (90 hrs/99 hrs - Architectural) (90 hrs/44 hrs - Mechanical)	To provide the student with the necessary skills, related technical information and ability to meet initial job entry performance standards to operate certain items of reproduction equipment commonly used in graphic communications (drafting). Emphasis is on Diazo Process equipment, black and white photography (take, develop and print) microfilm photography, and electrostatic copiers.
Block 4.0 (90 hrs/33 hrs - Architectural) (90 hrs/33 hrs - Mechanical)	To provide the student with: (a) information as to the advantages and application of freehand drawing and sketching in graphic communications; (b) the basic skills required to sketch and draw freehand objects to communicate shape and composition from observation, written or verbal descriptions or own mental image, using orthographic projections and pictorials in such portrayals.
Block 5.0 (45 hrs/33 hrs - Architectural) (45 hrs/33 hrs - Mechanical)	To provide the student with the ability to: (a) define and identify the elements of graphic composition: (b) control composition of graphics jobs using the various elements of graphic composition.
Block 6.0 (45 hrs/33 hrs - Architectural) (45 hrs/33 hrs - Mechanical)	To provide the student with the primary skills required to letter freehand, use various mechanical lettering devices and transfer types of lettering procedures commonly employed in graphic communications.

INSTRUCTIONAL OBJECTIVE OF DRAFTING (GRAPHIC COMMUNICATIONS) PART I (BASIC)

To provide the student with the basic knowledge, skills, and related technical information considered as required for:

A. Initial entry employment at the basic job level in the general area of graphic communications with emphasis on the specific field of drafting.

B. Entry into advanced program instruction in the primary specialty areas of drafting such as: architectural, machine and building trades, at the community college/technical institute level based upon credit received for articulated course work successfully completed at the secondary school level.

C. Entry into the advanced program specialty areas of drafting following successful completion of Part I (Basic) instruction at the post-secondary level of education. (Note: It should be possible for high school students who have successfully completed at least Blocks 0.0 and 1.0 of the articulated program to receive credit for same if they enroll at the post-secondary level to complete Part I (Basic) and enter advanced program instruction.)

Consideration should also be given to the potential of this program segment (Part I-Basic) to prepare students for entry into a series of advanced skill related fields in the general area of graphics, i.e.: Commercial Art, Landscape Architecture, Mechanical Drafting (Industrial and Machine Design), Architectural Drawing, Architectural Illustration, Technical Illustration, Commercial Graphics (Layout) and Audio Visual Technician.

JOB QUALIFICATION OR SKILLS GAINED: (Part I-Basic)

Successful completion of instruction of Blocks 0.0, 1.0, 2.0 and 3.0 can result in initial entry job qualification as a Blueprint Machine Operator (Diazo) (D.O.T. 976.782), Reproduction Technician (D.O.T. 976.381), or Microfilm Technician (D.O.T. 979.381). Successful completion of all blocks (0.0 through 6.0) of instruction of Part I-Basic should be considered an initial entry job qualification as an Apprentice Draftsman with two years experience in any of the related fields of graphic communications.

PREREQUISITES: See each block summary sheet.

PERFORMANCE EVALUATION: Test items for task performance evaluation for job or advanced instruction qualification are attached to each instructional block.

EQUIPMENT: See consolidated equipment list attached to the last block of this program.

ACADEMIC AND NON-DRAFTING COURSES OF INSTRUCTION COMMONLY REQUIRED OR INCLUDED IN SPECIALIZED DRAFTING (GRAPHIC COMMUNICATIONS) CURRICULUM IN NORTH CAROLINA COMMUNITY COLLEGES/TECHNICAL INSTITUTES:

Specialty: Mechanical Drafting (2-year program)

Course Title	Course Number	Contact Hours/Qtr.
Algebra	MAT 101	55
Trigonometry	MAT 102	55
Introduction to Calculus	MAT 103	55
English Grammar	ENG 101	33*
English Composition	ENG 102	33*
Technical Writing	ENG 103	33*
Public Speaking	ENG 251	33
Physics I	PHY 151	66
Physics II	PHY 152	66
Physics III	PHY 153	66
Statics	MEC 105	55
Strength of Materials	MEC 205	66
Mechanisms	DFT 211	66
Metallurgy I	MEC 210	55
Metallurgy II	MEC 211	55
Social Science Electives		66
Electives (Technical Related Subjects)		88

*Note: Contact hours may vary at different institutions.

Specialty: Architectural Drafting (2-year program)

Course Title	Course Number	Contact Hours/Qtr.
Grammar	ENG 1101	33
Industrial Communications	ENG 1102	33
Report Writing	ENG 1103	33
Algebra	MAT 1102	55
Geometry	MAT 1103	33
Trigonometry	MAT 1104	55
Economics	ECO 1105	33
Applied Psychology	PSY 1106	33
Applied Science I	PHY 1101	55
Applied Science II	PHY 1102	55
History of Art and Architecture	CAT 1121	44
Reproduction Processes II	CAT 1112	99

Specialty: Building Trades Drafting (1-year program)

Course Title	Course Number	Contact Hours/Qtr
Trigonometry	MAT 1104	33
Fundamentals of Math	MAT 1101	55
College Orientation	GUI 1101	11
Algebra	MAT 1102	55
Communication Skills	ENG 1102	55
Applied Science I	PHY 1101	33
Applied Science II	PHY 1102	33
Human Relations	PSY 1101	33
Small Business Operations	BUS 1103	33
Industrial Organization	BUS 1101	33
Industrial Safety	ISC 1101	33

Note: Building Trades Drafting is essentially an abbreviated vocational architectural program with the majority of technical courses also to be found in the two year Architectural Drafting Program.

ACADEMIC (NON-DRAFTING/GRAPHIC COMMUNICATIONS) COURSES/SUBJECTS CONSIDERED DESIRABLE FOR HIGH SCHOOL STUDENTS WHO PROPOSE TO FOLLOW THE DRAFTING (GRAPHIC COMMUNICATIONS) CURRICULUM:

1977-1978

Course/Subject	Units
English I, II, III, & IV	4
Algebra I*	1
Geometry **	1
Physical Science	1
Biology	1
Industrial Practice	1
Social Studies	1
U. S. Studies	1
Electives	3
Health and Physical Education	1

(Academic & Technical)	Total	15
(Drafting)	Total	3
Curriculum	Total	18

* Drafting courses at most CC/TI require Algebra and Trigonometry.

** Geometric figures, angles and other aspects of geometry are integral elements of drafting, in all phases. A student who has not had geometry will have difficulty comprehending many instructional objectives in drafting.

ARTICULATION RESEARCH PROJECT
OCCUPATIONAL TASKS
DRAFTING (GRAPHIC COMMUNICATIONS)

BLOCK OR DIVISION: Introduction to Graphics (Drafting). 0.0

TASK:		Frequency of Task Performance By Average Worker.			Job Level at Which Task Is Usually Performed or Applies.		
		SELDOM	WEEKLY	DAILY	LOWEST	INTERMEDIATE	HIGHEST
0.01	Know history of drafting.	N/A	N/A	N/A	X	X	X
0.02	Know employment opportunities in field of drafting/graphics.	N/A	N/A	N/A	X	X	X
0.03	Know average wage scales and fringe benefits in field.	N/A	N/A	N/A	X	X	X
0.04	Know specialized fields in drafting/graphics.	N/A	N/A	N/A	X	X	X
0.05	Know career opportunities in drafting/graphics.	N/A	N/A	N/A	X	X	X
0.06	Know application of drawings as used in industry.	N/A	N/A	N/A	X	X	X
0.07	Know environment and working conditions in the field of drafting.	N/A	N/A	N/A	X	N/A	N/A
0.08	Know techniques that lead to getting and holding a job and to advancement in the field of drafting.	N/A	N/A	N/A	X	X	X
0.09	Use basic drafting equipment.			X	X	X	X
0.10	Incorporate draftsman's alphabet of lines in making drawings.			X	X	X	X
0.11	Construct geometric figures using basic drafting equipment.			X	X	X	X

ARTICULATION RESEARCH PROJECT
OCCUPATIONAL TASKS
DRAFTING (GRAPHIC COMMUNICATIONS)

BLOCK OR DIVISION: Basic Technical Drafting (Basic Graphic Communication). 1.0

TASK:	Frequency of Task Performance By Average Worker			Job Level at Which Task Is Usually Performed or Applies.		
	SELDOM	WEEKLY	DAILY	LOWEST	INTERMEDIATE	HIGHEST
1.01 Draw objects using orthographic projections.			X	X	X	X
1.02 Draw objects using axonometric system.			X	X	X	X
1.03 Draw objects in the oblique.			X	X	X	X
1.04 Draw objects in the perspective.			X	X	X	X
BLOCK OR DIVISION: Problem Solving in Graphics. 2.0						
2.01 Define the problem.			X	X	X	X
2.02 Identify problem limits.			X	X	X	X
2.03 Use technical literature in developing a research base for the problem.			X	X	X	X
2.04 Analyze available related information and select problem solving method.			X	X	X	X
2.05 Design and implement a strategy for experimental purposes.			X	X	X	X
2.06 Analyze and record results of experimental strategy.			X	X	X	X
2.07 Have an alternate strategy if first choice does not work.			X	X	X	X

ARTICULATION RESEARCH PROJECT
OCCUPATIONAL TASKS
DRAFTING (GRAPHIC COMMUNICATIONS)

BLOCK OR DIVISION: Problem Solving in Graphics. (con't.) 2.0

TASK:	Frequency of Task Performance By Average Worker.			Job Level at Which Task Is Usually Performed or Applies.		
	SELDOM	WEEKLY	DAILY	LOWEST	INTERMEDIATE	HIGHEST
2.08 Summarize and present the sequence of events and steps utilized in problem solving from definition to solution.			X	X	X	X
BLOCK OR DIVISION: Reproduction Processes 3.0						
3.01 Know common reproduction processes used in graphics.			X	X	X	X
3.02 Know operating principles and capabilities of diazo reproduction machine.			X	X	X	X
3.03 Make reproductions using diazo machines.			X	X	X	X
3.04 Take black and white photographs.		X		X	X	X
3.05 Develop black and white film.		X		X	X	
3.06 Print black and white pictures.		X		X	X	
3.07 Know principles of operation and capabilities of microfilm process.			X	X	X	X
3.08 Make microfilm copies of documents, drawings, and plans.			X	X	X	
3.09 Reproduce documents (make copies) using electrostatic type equipment.			X	X	X	X

ARTICULATION RESEARCH PROJECT
OCCUPATIONAL TASKS
DRAFTING (GRAPHIC COMMUNICATIONS)

BLOCK OR DIVISION: Freehand Drawing and Sketching. 4.0

TASK:	Frequency of Task Performance By Average Worker. SELDOM	WEEKLY	DAILY	Job Level at Which Task Is Usually Performed or Applies. LOWEST	INTERMEDIATE	HIGHEST
4.01 Know need for and advantages of freehand sketching and drawing skills.			X	X	X	X
4.02 Sketch freehand to communicate shape and composition.			X	X	X	X
4.03 Sketch views of objects using orthographic projections and pictorials.			X	X	X	X
BLOCK OR DIVISION: Graphics Composition 5.0						
5.01 Identify and define elements of graphics composition.			X	X	X	X
5.02 Control graphic compositions using elements of the composition, ie: 5.021 - Location 5.022 - Form 5.023 - Hue 5.024 - Size 5.025 - Value (intensity) 5.026 - Direction 5.027 - Symmetry and balance			X	X	X	X

ARTICULATION RESEARCH PROJECT
OCCUPATIONAL TASKS
DRAFTING (GRAPHIC COMMUNICATIONS)

BLOCK OR DIVISION: Lettering (Graphic Communications). 6.0

TASK:	Frequency of Task Performance By Average Worker.			Job Level at Which Task Is Usually Performed or Applies.		
	SELDOM	WEEKLY	DAILY	LOWEST	INTERMEDIATE	HIGHEST
6.01 Letter freehand using different techniques and styles as appropriate.			X	X	X	X
6.02 Letter using transfer letters.			X	X	X	X
6.03 Letter using mechanical devices.			X	X	X	X
6.04 Letter using templates.			X	X	X	X
6.05 Letter using photographic processes.			X	X	X	X

- E -

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphics Communication)

COURSE: Introduction to Graphics (Drafting) (Block 0.0)

COURSE DESCRIPTION: Department of Public Instruction: Included in Course Numbers 7551 and 7552. Introduction to Technical Drafting I and Basic Technical Drafting II
Department of Community Colleges: Included in DFT 1121 and ARC 1226.

INSTRUCTIONAL HOURS: High Schools - 20
CC/TI - 20

INSTRUCTIONAL OBJECTIVES:

1. To give occupational information about a variety of drafting occupations and activities depending upon drafting.

2. To provide experience and develop skills in the use of working tools and materials and to meet the need for accuracy, legibility, technique and speed which are required in industrial drafting rooms.

3. To give training in the use of working drawings and to learn the language of the trade.

4. To develop a knowledge of the relationships made possible by drawings, industrial planning, processes, and organization.

5. To provide opportunities for developing usable drafting techniques.

6. To develop habits of independent and methodical procedure in the making of drawings.

7. To foster interest and knowledge of the importance of mathematics as applied to drafting.

JOB QUALIFICATION OR SKILLS GAINED:

This is a basic (beginning) drafting course. Upon satisfactory completion of this instruction the student is prepared to learn the primary skills required for architectural, machine, or other drafting requirements. The information provided in this block pertaining to the occupation is introductory in nature and is repeated, updated, and made more specific by integration in the advanced stages of the program.

PREREQUISITES:

High School - Desirable T & I 7300-Introduction to Trade and Industrial Education.

PERFORMANCE EVALUATION:

Test items for competency evaluation attached. Test items are competency based and of outline type, relating to primary tasks.

EQUIPMENT:

See consolidated equipment list attached to last block of this program.

BLOCK OR DIVISION NUMBER: 0.0 TITLE: Introduction to Graphics (Drafting).

RELATED GENERAL INFORMATION AND VOCATIONAL GUIDANCE:

TASKS:

0.01 Know history of drafting.
Instructional Objective: Learn the history of drafting.

0.02 Know employment opportunities in drafting.
Instructional Objective: Learn the employment opportunities in drafting.

0.03 Know salary and fringe benefits in the fields of drafting/graphics.
Instructional Objective: Learn the salary and fringe benefits in the fields of drafting.

0.04 Know specialized fields in drafting/graphics.
Instructional Objective: Learn the career opportunities in the field of drafting.

0.05 Know career opportunities in the fields of drafting.
Instructional Objective: Learn the career opportunities in the field of drafting.

0.06 Know application of drawings as used in industry.
Instructional Objective: Learn the application of drawings as used in industry.

0.07 Know environment and working conditions in the fields of drafting.
Instructional Objective: Learn environment and working conditions in the fields of drafting.

0.08 Know techniques of getting and holding a job and advancing in drafting.
Instructional Objective: How to get and hold a job and advance in drafting.

SUGGESTED INSTRUCTIONAL TIME: 0.0, 5 hours.

PERFORMANCE STANDARDS:

Student can state the basic facts of each task with accuracy.

BLOCK OR DIVISION NUMBER: 0.0 TITLE: Introduction to Graphics (Drafting). (con't.)

TASK NUMBER: 0.09 TITLE: Use Basic Drafting Equipment.

INSTRUCTIONAL OBJECTIVE - 0.09: How to Use Basic Drafting Equipment.

SKILLS: (Process Objectives)

How To:

0.091 - Use T-square, triangle, pencils, leads, papers, erasers and erasing shields.
0.092 - Draw lines from horizortal to vertical in 15° angle increments.
0.093 - Draw parallel lines and perpendicular lines.
0.094 - Measure using draftsman's scales of different types.
0.095 - Sharpen pencils and leads.
0.096 - Fasten drawing papers to drawing board.
0.097 - Rotate and position pencil when drawing.
0.098 - Check T-square for squareness.
0.099 - Use dusting brush.
0.0910 - Lay out borders on paper.
0.0911 - Clean and maintain drafting equipment and table.
0.0912 - Use drafting supply and equipment catalogs.

RELATED TECHNICAL INFORMATION:

- Paper sizes and types of paper and their uses.
- Different grades and uses of each grade of pencil lead.
- Information contained in standard supply and equipment catalogs.
- Recognize difference between architectural, civil engineer and mechanical scales and the units of measurement available.

SUGGESTED INSTRUCTIONAL TIME: 0.09, 5 hours.

REQUIRED PERFORMANCE STANDARDS: (Where appropriate, neatness applies.)

- T-square: uses same working edge of drawing board when drawing.
  Triangles: uses same edge of T-square throughout entire drawing; triangles placed and held firmly against T-square blade.
  Pencils and leads: selects proper lead for task.
  Papers: selects proper size paper for task.
  Erasers: selects correct erasers for error to be erased.
  Eraser shields: selects correct cutout for error to be erased.
- Draw lines in 15° angle increments plus or minus 1° accuracy.
- Draw lines to 100% accuracy.
- Keeps sharpened to conical point for lettering and general drawing; to chisel point for use in compass.
- Uses tape and follows correct attachment steps.
- Rotates and holds pencil to maintain uniform lines.

REQUIRED PERFORMANCE STANDARDS: (continued)

- Checks T-square to see that blade and head align properly, using 90° angle.
- Keep drawing free from foreign matter.
- The border line conforms with the alphabet of lines.
- Student keeps his table and equipment clean and in an orderly manner specified by instructor.
- Finds items required and list part numbers to 95% accuracy.
- Read scales to 100% accuracy.
- Lay out and draw lines of different lengths to 100% accuracy.

BLOCK OR DIVISION NUMBER: 0.0 TITLE: Introduction to Graphics (Drafting). (con't.)

TASK NUMBER: 0.10 TITLE: Incorporate the Draftsman's Alphabet of Lines In Making Drawings.

INSTRUCTIONAL OBJECTIVE - 0.10: How to Apply the Draftsman's Alphabet of Lines In Making Drawings.

SKILLS: (Process Objectives)

0.0101 - How to draw the alphabet of lines.

RELATED TECHNICAL INFORMATION:

- Know identification and purpose of each type of line used in drafting.
- Know alphabet of line weights.

SUGGESTED INSTRUCTIONAL TIME: 0.10, 3 hours.

REQUIRED PERFORMANCE STANDARDS: (Where appropriate, neatness applies.)

- Draws to 95% accuracy the alphabet of lines.

Appropriate elements of American Standards Association conventions and practices also apply.

BLOCK OR DIVISION NUMBER: 0.0 TITLE: Introduction to Graphics (Drafting) (con't.)

TASK NUMBER: 0.11 TITLE: Construct Geometric Figures and Polygons.

INSTRUCTIONAL OBJECTIVE - 0.11: How to Construct Geometric Figures and Polygons.

SKILLS: (Process Objectives)

How to:

0.111 - Construct geometric figures: Using compasses, protractor, French curve, dividers to construct:
- Hexagons
- Octagons
- Bisect Angles, arcs and lines
- Tangents
- Pentagons
- Polygons
- Squares
- Circles
- Stars
- Triangles
- Erect perpendiculars
- Divide lines into equal parts
- Lines and curves
- Irregular curves
- Ellipses

0.112 - Sharpen compass leads.
0.113 - Find geometric figure centers.
0.114 - Use various drawing instrument accessories.

RELATED TECHNICAL INFORMATION:

- Geometric definitions.
- Types and purposes of drawing instrument accessories.

SUGGESTED INSTRUCTIONAL TIME: 0.011, 7 hours.

REQUIRED PERFORMANCE STANDARDS: (Where appropriate, neatness applies.)

- Uses compasses, protractor, French curve, and dividers to 95% accuracy to construct above listed geometric figures.
- Keeps compass lead sharpened to a chisel point.
- Displays with 85% accuracy how to find geometric figure centers.
- Instrument accessories are used to instructor's satisfaction.

Appropriate elements of American Standards Association conventions and practices also apply.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 0.0 TITLE: Introduction to Graphics (Drafting)

Task

0.07 The student will state briefly in writing or orally three common uses of drawings prepared by draftsmen.
Standard: Evidence of adequate knowledge of purpose of working drawings.

0.091 The student will demonstrate how to use the T-square, triangle, pencil leads, papers, erasers and erasing shields.
Standard: As per ANSI.

0.092 Given T-square and triangles, paper and tape, students will draw lines from horizontal to vertical angles in increments of 15°.
Standard: To + 1° accuracy.

0.093 The student will draw parallel and perpendicular lines, standard methods of construction using T-square and triangles.
Standard: 100% accuracy.

0.094 Given the different types of drafting scales the student will identify each and state the differences.
Standard: 100% accuracy.

0.094 The student will read and record the distance between the given points on a given scale and pencil in a series of points and lines.
Standard: 100% accuracy.

0.094 The student will lay out and draw 10 different lengths of lines, given the scale to use and dimensions required for each line.
Standard: 90% accuracy.

0.095 The student will sharpen pencil and leads to conical and chisel points.
Standard: Lead points suitable for fine line drawing.

0.096 Students will attach paper to drawing board in proper sequence.
Standard: Paper smooth, secure and square on drawing board.

0.097 The student will demonstrate how to rotate and position pencil when drawing.
Standard: Observation by instructor.

0.098 The student will check T-square for proper alignment using 30-60° or 45° triangle.
Standard: T-square rule secure to head and at 90°.

0.0910 The student will demonstrate the method and correct line weight of border lines when necessary.
Standard: Lines drawn and identified correctly according to type of drawing.

TEST ITEMS (Con't.)

Task

0.0912 The student will demonstrate how to use drafting supply and equipment catalogs, given an order form and catalog.
Standard: Identifies item name and catalog number correctly.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphics Communication)

COURSE: Basic Technical Drafting (Basic Graphics Communication) (1.0)

COURSE DESCRIPTION: Department of Public Instruction: Included in Course Numbers 7551 and 7552, Introduction to Technical Drafting I and Basic Technical Drafting II.

Department of Community Colleges: ARC 1226, DFT 101
DFT 1121, 1122

INSTRUCTIONAL HOURS: High Schools - 160
CC/TI - 88*

INSTRUCTIONAL OBJECTIVES:

1. To develop a knowledge about orthographic drawings.
2. To draw objects using orthographic drawings.
3. To draw objects using axonometric system.
4. To draw objects using oblique drawings.
5. To draw objects using perspective drawings.

JOB QUALIFICATION OR SKILLS GAINED:

This is a basic (beginning) visualization course. Upon satisfactory completion of this instruction, the student is prepared to learn the primary skills required for activities where basic visualization skills are needed. Also, the student is prepared to take more of the advanced courses in graphic communications.

PREREQUISITES: Introduction to Graphics (Drafting) (Block 0.0)

PERFORMANCE EVALUATION:

By competency based procedures. The student must demonstrate possession of required information and ability to perform required tasks and meet required performance standards. See outline type test items attached.

EQUIPMENT:

See consolidated equipment list attached to last block of program.

*Note: At the CC/TI level the instruction providing the skills and related technical information acquired in this block is repeated and used in succeeding blocks to provide the student with more advanced levels of the same basic skills, resulting in up to three times the initial instruction in this area.

BLOCK OR DIVISION NUMBER: 1.0 TITLE: Basic Technical Drafting (Basic Graphic Communications)

TASK NUMBER: 1.01 TITLE: Draw Objects Using Orthographic Drawings.

INSTRUCTIONAL OBJECTIVE - 1.01: How to Draw Objects Using Orthographic Drawings.

SKILLS: (Process Objectives)

How to:

1.011 - Draw orthographic projections of the six principle views using third angle projection.
1.012 - Draw orthographic projections of the three primary views.
1.013 - Draw auxiliary orthographic views.
1.014 - Draw section views.

RELATED TECHNICAL INFORMATION:

- Know history and origin of orthographic drawings.
- Know relationship of six principle views according to third angle projection.

SUGGESTED INSTRUCTIONAL TIME: 1.01, 36-72 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS: (Where appropriate, neatness applies.)

- Visualize within the orthographic drawing system with 85% accuracy.

BLOCK OR DIVISION NUMBER: 1.0 TITLE: Basic Technical Drafting (Basic Graphic Communications) (con't.)

TASK NUMBER: 1.02 TITLE: Draw Objects Using Axonometric System.

INSTRUCTIONAL OBJECTIVE - 1.02: How to Draw Objects Using Axonometric System.

SKILLS: (Process Objectives)

How to:

1.021 - Draw an object in isometric.
1.022 - Draw an object in dimetric.
1.023 - Draw an object in trimetric.
1.024 - Draw axonometric sections.

RELATED TECHNICAL INFORMATION:

- Know history and origin of axonometric system.
- Know difference between projected and constructed axonometric drawings.

SUGGESTED INSTRUCTIONAL TIME: 1.02, 10-20 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS: (Where appropriate, neatness applies.)

- Draws axonometric system with 85% accuracy.

BLOCK OR DIVISION NUMBER: 1.0 TITLE: Basic Technical Drafting (Basic
Graphic Communications) (Con't.)
TASK NUMBER: 1.03 TITLE: Draw Objects Using Oblique Drawings.

INSTRUCTIONAL OBJECTIVE - 1.03: How to Draw Objects Using Oblique Drawings.

SKILLS: (Process Objectives)

1.031 - How to draw an oblique with:
- Top Emphasis
- Cavalier
- Right Side Emphasis
- Reverse Axis
- Cabinet
- Forshortened

RELATED TECHNICAL INFORMATION:

- Know history and origin of oblique drawings.

SUGGESTED INSTRUCTIONAL TIME: 1.03, 10-20 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Draws oblique drawings with 85% accuracy.
- Where appropriate, neatness applies.

BLOCK OR DIVISION NUMBER: 1.0 TITLE: Basic Technical Drafting (Basic Graphic Communications) (Con't.)

TASK NUMBER: 1.04 TITLE: Draw Objects Using Perspective Drawings.

INSTRUCTIONAL OBJECTIVE - 1.04: How to Draw Objects Using Perspective Drawings.

SKILLS: (Process Objectives)

1.041 - How to draw an object using the systems perspective with the following elements:

I. Variables of Perspective - Station Point
  A. Angles of View
    1. Horizontal angle
    2. Vertical angle
  B. Distance from the Object
    1. Cone of vision
II. Ground Line
III. Picture Plane
IV. Horizon Line
V. Vanishing Points
  A. Lines parallel to picture plane
  B. Horizontal lines not parallel to picture plane
  C. All other lines
VI. Vertical Measurements
VII. Horizontal Measurements
  A. Sighting
  B. Measuring

RELATED TECHNICAL INFORMATION:

- Know history and origin of perspective drawings.
- Know elements of perspective.

SUGGESTED INSTRUCTIONAL TIME: 1.04, 24-48 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Draws perspective drawings with 85% accuracy.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 1.0 TITLE: Basic Technical Drafting (Basic Graphic Communications.)

TASK

1.01 Given an object with a requirement to draw the object using orthographic projections, the student will draw:

a. Orthographic projections of two of six principle views using third angle projections.
b. Orthographic projection of one of the three primary views.
c. One auxiliary orthographic view.
d. One section view of object.

Standard: Student demonstrates ability to visualize and draw neatly in the orthographic system the required views with 85% accuracy.

1.02 Given an object to be drawn using the axonometric system, the student will draw the object using one of the following procedures:

a. In isometric.
b. In dimetric.
c. In trimetric.

Standard: Performs task accurately (85%) and neatly.

1.02 Given drawings made by projected and constructed axonometric procedures, the student will identify correctly the axonometric procedure used for each drawing.
Standard: 100% accuracy.

1.03 Given an object to be drawn in the oblique, the student will be required to draw in the oblique using three of the following:

a. Top emphasis.
b. Cavalier.
c. Right side emphasis.
d. Reverse axis.
e. Cabinet.
f. Forshortened.

Standard: Student follows procedures and presents correct view for obliques selected with 85% accuracy; neatness applies.

1.04 Given an object to be drawn using the systems perspective, the student will draw object in perspective with the following elements applied and identified:

a. Variables of perspective.
b. Ground line.
c. Picture plane.
d. Horizon line.
e. Vanishing points.

Standard: Student draws object in perspective applying four of five required elements correctly. Identifies each element applied correctly; neatness applies.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphics Communications)

COURSE: Problem Solving in Graphics (Block 2.0)

COURSE DESCRIPTION: Department of Public Instruction: N/A

Department of Community Colleges: CAT 1120 (Creative Problem Solving)

INSTRUCTIONAL HOURS: High Schools - 90 hours
CC/TI - 44 hours*

INSTRUCTIONAL OBJECTIVES:

To provide the student with the basic skills and related information required to solve occupational problems (with emphasis on graphics) by organizing the thought processes, planning and application of available, appropriate resources.

JOB QUALIFICATIONS:

This block of instruction is considered as an essential component in the development of initial entry skills and knowledge required for qualification at the basic job level in graphic communications occupations.

PREREQUISITES:

High Schools - None
CC/TI - None

PERFORMANCE EVALUATION:

See test item outlines attached.

EQUIPMENT:

See attached equipment list.

*Note: This time allocation is for specific instruction in the subject area. Additional time is devoted to the subject by integration and application into subsequent and specialty area blocks of instruction.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics

TASK NUMBER: 2.01 TITLE: Define Problem.

INSTRUCTIONAL OBJECTIVE - 2.01: How to Define the Problem.

SKILLS: (Process Objectives)

2.011 - How to state the problem.

RELATED TECHNICAL INFORMATION:

- Source of the problem.
- Problem situation.
- Given information.
- Expected application of problem solution.

SUGGESTED INSTRUCTIONAL TIME: 2.01, 3-5 hours.* (For planning only)

*Determined by class aptitudes, evidence of comprehension, and total time allocated for block.

REQUIRED PERFORMANCE STANDARDS:

- Communicates the problem clearly in writing in a logical manner so that it is obvious that the student knows the problem.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics (Con't.)

TASK NUMBER: 2.02 TITLE: Identify Problem Limits.

INSTRUCTIONAL OBJECTIVE - 2.02: How to Identify Problem Limits.

SKILLS: (Process Objectives)

How to:

2.021 - Identify and apply economic (financial) limits.
2.022 - Identify and apply time limits.
2.023 - Identify and apply equipment and material limits.
2.024 - Identify and apply technology limits.
2.025 - Identify and apply ecological limits.
2.026 - Identify and apply legal limits.
2.027 - Identify and apply personal limits.

RELATED TECHNICAL INFORMATION:

- Cost and profits.
- Codes, laws, and ordinances.
- Materials and equipment handbooks.
- Professional publications.
- E.P.A., OSHA regulations.

SUGGESTED INSTRUCTIONAL TIME: 2.02, 5-10 hours.* (For planning only.)

*Flexible - Determined by class aptitudes, evidence of comprehension and total allocated time for block.

REQUIRED PERFORMANCE STANDARDS:

Communicates clearly in writing the problem limits in a logical manner so that it is obvious the student can apply basic factors of determining and identifying the problem limits.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics (con't.)

TASK NUMBER: 2.03 TITLE: Use of Technical Literature as Research Base.

INSTRUCTIONAL OBJECTIVE - 2.03: How to Use Technical Literature as Research Base.

SKILLS: (Process Objectives)

How to:

2.031 - Use reference library.
2.032 - Use indexes of abstracts of technical publications.
2.033 - Search publications for desired information.

RELATED TECHNICAL INFORMATION:

- Types of technical literature.
- Catalogues and indexes for equipment and materials.
- Research publications.
- Publications which provide abstracts of writings and research reports in specific occupational fields.
- Indexes of laws and codes.

SUGGESTED INSTRUCTIONAL TIME: 2.03, 5-15 hours.* (For planning only.)

*Flexible - Determined by class aptitudes, evidence of comprehension and total allocated time for block.

REQUIRED PERFORMANCE STANDARDS:

- Student can locate reference publications required in library or other storage facility.
- Can identify document(s) with desired information.
- Can find desired information in publications.
- Records necessary data.

BLOCK OR DIVISION NUMBER: 2.0 TITLE Problem Solving in Graphics (con't.)

TASK NUMBER: 2.04 TITLE: Analyze Information and Select Method of Problem Solution.

INSTRUCTIONAL OBJECTIVE - 2.04: How to Analyze Information and Select Method of Problem Solution.

SKILLS: (Process Objectives)

How to:

2.041 - Analyze information (functional, aesthetical, environmental, technical) etc.
2.042 - Select problem solving method (process of elimination based on logic, trial and error, or historical).
2.043 - Select alternate problem solving method.

RELATED TECHNICAL INFORMATION:

- Technical references.
- Historical information.
- Research guides.
- Need for selection of alternate problem solving strategy.

SUGGESTED INSTRUCTIONAL TIME: 2.04, 2-7 hours.* (For planning only)

*Flexible - determined by class aptitudes, evidence of comprehension and total allocated time for block.

REQUIRED PERFORMANCE STANDARDS:

- Shows ability to make and use necessary charts and diagrams pertaining to information being analyzed.
- Applies deliberate selection method(s) to include consideration of historical data and information.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics (con't.)

TASK NUMBER: 2.05 TITLE: Design and Implement a Strategy for Experimental Purposes.

INSTRUCTIONAL OBJECTIVE - 2.05: How to Design and Implement a Strategy for Experimental Purposes.

SKILLS: (Process Objectives)

How to:

2.051 - Design experimental strategy (determine process and steps to be used - limits, etc.).
2.052 - Implement experimental strategy (perform the steps determined as required for experiment or test and apply available appropriate information).

RELATED TECHNICAL INFORMATION:

- Technical references.
- Problem solving references.
- Research guides.

SUGGESTED INSTRUCTIONAL TIME: 2.05, 4-8 hours.* (For planning only.)

*Flexible-determined by class aptitudes, evidence of comprehension and total time allocated for block.

REQUIRED PERFORMANCE STANDARDS:

- Student designs a process to be used in experiment, with steps identified in logical sequence.
- Student follows approved steps in experimental design procedures and uses available information.

BLOCK OR DIVISION NUMBER: 2.0 TITLE Problem Solving in Graphics (con't.)

TASK NUMBER: 2.06 TITLE Record and Analyze Data.

INSTRUCTIONAL OBJECTIVE - 2.06: How to Record and Analyze Data.

SKILLS: (Process Objectives)

How to:

2.061 - Record data.
2.062 - Analyze data.

RELATED TECHNICAL INFORMATION:

- All previous information.
- Research guides.

SUGGESTED INSTRUCTIONAL TIME: 2.06, 3-5 hours.* (For planning only.)

*Flexible-determined by class aptitudes, evidence of comprehension, and total time allocated for block.

REQUIRED PERFORMANCE STANDARDS:

- Records data in logical and clear manner.
- Demonstrates ability to analyze data and accept or reject data as appropriate.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics (con't.)

TASK NUMBER: 2.07 TITLE: Be Prepared to Implement Alternate Strategy.

INSTRUCTIONAL OBJECTIVE - 2.07: How to Prepare an Alternate Strategy.

SKILLS: (Process Objectives)

(Skills acquired in instructional objectives 2.04, 2.05, and 2.06 apply.)

RELATED TECHNICAL INFORMATION:

- Need for alternate strategies.
- All information developed for instructional objectives 2.04, 2.05, and 2.06.

SUGGESTED INSTRUCTIONAL TIME: 2.07, 2-5 hours.* (For planning only.)

*Flexible-this constitutes a review of instructional objectives 2.04, 2.05, and 2.06.

REQUIRED PERFORMANCE STANDARDS:

- Apply standards for tasks 2.04, 2.05, and 2.06.

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics (con't.)

TASK NUMBER: 2.08 TITLE: Summarize and Present Sequence of Problem Solving Events.

INSTRUCTIONAL OBJECTIVE - 2.08: How to Summarize and Present Sequence of Problem Solving Events.

SKILLS: (Process Objectives)

How to:

2.081 - Summarize experimental events.
2.082 - Present solution to problem (graphic models, technical illustrations, etc.).
2.083 - Prepare simple graphic models, charts, technical illustrations and transparencies.

RELATED TECHNICAL INFORMATION:

- Technical references.
- Research guides.
- Use of models and illustrations in problem solving.

SUGGESTED INSTRUCTIONAL TIME: 2.08, 20-35 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Prepares a clear written summarization of problem solving process and recommendations.
- Presents proposed solution orally utilizing appropriate graphic presentations and models.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics

(It is suggested that each test item utilize a problem or problems that relate to those commonly encountered in the drafting area of graphic communications.)

TASK:

2.00 Given a situation which contains a graphics problem with a requirement to solve the problem, the student will be required to demonstrate ability to:

- 2.01 A. Identify and communicate (state) clearly in writing the problem.
- 2.02 B. Identify and state clearly in writing the problem limits.
- 2.03 C. Search out appropriate technical literature from reference library and other sources, that applies to problem.
- 2.04 D. Analyze information developed from references and select a method by which to solve the problem.
- 2.05 E. Design a procedure to solve the problem with steps identified and listed in logical sequence.
- 2.06 F. Record and analyze the data developed in problem solving procedure.
- 2.07 G. Take precautionary measures to select an alternate problem solving strategy.
- 2.08 H. Summarize and present sequence of problem solving events in solution of problem.

Standards: A. Communicates the problem clearly in writing so that it is obvious the student has identified the problem.

B. Communicates the problem limits clearly in writing.

C. Student determines reference requirements and locates technical literature in library using locator files. Identifies appropriate documents, records necessary information accurately.

D. Shows ability to make and use appropriate charts and diagrams to prepare information to be analyzed. Applies deliberate selection procedures to determine problem solving methods, to include consideration of historical data.

E. Student selects and designs a problem solving procedure with steps identified in logical and correct sequence. Implements problem solving procedure and uses information and data developed to solve problem.

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER: 2.0 TITLE: Problem Solving in Graphics

Standards: F. Records data developed in problem solving in a clear, orderly, logical manner. Demonstrates ability to analyze data and accept or reject same as appropriate.

G. Apply standards A through E.

H. Prepares a clear written summarization of problem solving procedures and recommendations. Presents proposed solution orally, utilizing appropriate charts, graphs, models and transparencies. Demonstrates ability to make graphs, charts, models and transparencies that are simple, clear and appropriate for purpose used.

2.00 - Student should perform at least 85% of test items A through H correctly in reasonable time limits.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphic Communications)

COURSE: Reproduction Processes (Block 3.0)

COURSE DESCRIPTION: Department of Public Instruction: Included in part in 7792 (Graphics and Industrial Communications II)

Department of Community Colleges: CAT 1111 (Reproduction Processes I)

INSTRUCTIONAL HOURS: High Schools - 90 hours
CC/TI - Architectural: 99 hours
Mechanical: 44 hours

INSTRUCTIONAL OBJECTIVES:

To provide the student with the necessary skills, related technical information and ability to meet task performance standards required for job qualification to operate the common items of reproduction equipment used in the field of drafting and related areas of graphic communications. The emphasis is on the Diazo process, black and white photography, micro-film (make and maintain) and use of electrostatic copiers.

JOB QUALIFICATIONS:

This block of instruction provides initial entry job qualification to make Diazo prints; take, develop and print black and white photographs; make and mount microfilm and use electrostatic reproduction equipment. D.O.T. Job Title Qualifications: Blue Printing Machine Operator (Diazo Type Operator) - 979.782; Reproduction Technician - 976.381; or Microfilm Technician - 979.381.

PREREQUISITES:

None

PERFORMANCE EVALUATION:

See test items attached to be conducted at end of program.

EQUIPMENT:

See attached equipment list.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK NUMBER: 3.01 TITLE: Know Common Reproduction Processes Used in Graphics.

INSTRUCTIONAL OBJECTIVE - 3.01: To Learn Common Reproduction Processes Used In Graphics.

SKILLS: (Process Objectives)

How to:

3.011 - Learn types of common reproduction processes.
3.012 - Learn types of common reproduction equipment.
3.013 - Learn uses of material prepared by different common reproduction processes.

RELATED TECHNICAL INFORMATION:

- Equipment manuals.

SUGGESTED INSTRUCTIONAL TIME: 3.01, 2-2 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Demonstrates knowledge of types of reproduction procedures.
- Demonstrates knowledge of types of reproduction equipment.
- Demonstrates knowledge of how material prepared by different processes are used.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.02 TITLE: Know Operation Principles of Diazo Reproduction Process.

INSTRUCTIONAL OBJECTIVE - 3.02: To Learn Operating Principles of Diazo Reproduction Process.

SKILLS: (Process Objectives)

3.021 - Know primary components and their functions of Diazo machine.
3.022 - Know Diazo machine capabilities.
3.023 - Know different types of Diazo process equipment.

RELATED TECHNICAL INFORMATION:

- Trade terminology.
- Machine operating manual.
- Trade catalogues (supply).
- Safety considerations.
- Types of papers and dyes used in Diazo process.
- Uses of various types of reproductions.

SUGGESTED INSTRUCTIONAL TIME: 3.02, 2-2 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Can identify accurately the operating components (100%) of the Diazo Machine.
- Demonstrates knowledge of Diazo process.
- Demonstrates knowledge of safety requirements for Diazo process.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.03 TITLE: Make Reproductions Using Diazo Machine.

INSTRUCTIONAL OBJECTIVE - 3.03: How to Make Reproductions Using Diazo Machine.

SKILLS: (Process Objectives)

How to:

3.031 - Prepare Diazo type machine for operation.
3.032 - Operate machine.
3.033 - Maintain equipment.
3.034 - Store Diazo media (paper and film).
3.035 - Select media for specific job.
3.036 - Trim prints.

RELATED TECHNICAL INFORMATION:

- Manufacturer's operating manual.
- Types of reproductions.
- Paper classifications.
- Safety requirements.
- Diazo supply requirements.

SUGGESTED INSTRUCTIONAL TIME: 3.03 - HS - 15 hours
(For planning only.) CC/TI - Architectural: 15 hours
Mechanical: 15 hours

REQUIRED PERFORMANCE STANDARDS:

- Can demonstrate ability to operate Diazo equipment according to manufacturer's instructions.
- Demonstrates knowledge and ability of proper storage of Diazo media.
- Can select proper media for given job.
- Observes correct safety procedures.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.04 TITLE: Take Black and White Photographs.

INSTRUCTIONAL OBJECTIVE - 3.04: How to Take Black and White Photographs.

SKILLS: (Process Objectives)

3.041 - Know principles of photo processes.
3.042 - How to operate and maintain photographic equipment (Cameras-Polaroid and 35mm, lights, light meters, lenses-according to job, filters).
3.043 - How to use different types of BW film.
3.044 - How to store film.
3.045 - How to obtain desired photograph composition and effects.

RELATED TECHNICAL INFORMATION:

- Types of film.
- Types of equipment.
- Effect of light and background.
- Manufacturer's operating manuals.

SUGGESTED INSTRUCTIONAL TIME: 3.04 - HS - 20 hours
(For planning only.) CC/TI - Architectural: 20 hours
Mechanical: 0 hours

REQUIRED PERFORMANCE STANDARDS:

- Demonstrates ability to operate and maintain common items of photographic equipment according to manufacturer's manuals.
- Selects proper camera, film, and lenses for job.
- Demonstrates knowledge of photo processes.
- Demonstrates ability to obtain desired photograph effect and composition.
- Stores film correctly.

- Determines light requirements and uses artificial light correctly.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.05 TITLE: Develop Black and White Film.

INSTRUCTIONAL OBJECTIVE - 3.05: How to Develop Black and White Film.

SKILLS: (Process Objectives)

3.051 - Know principles of film development process.
3.052 - How to place undeveloped film on reel.
3.053 - How to prepare chemicals for black and white development.
3.054 - How to process film in chemicals.
3.055 - How to dry film.
3.056 - How to store developing materials.
3.057 - How to handle developed film.
3.058 - How to maintain developing equipment.

RELATED TECHNICAL INFORMATION:

- Safety requirements.
- Manufacturer's specifications for developing process.
- Effect of light on developing process.
- Equipment and material requirements.
- Darkroom requirements.
- Film storage requirements.

SUGGESTED INSTRUCTIONAL TIME: 3.05 - HS - 15 hours
(For planning only.) CC/TI - Architectural: 16 hours
Mechanical: 0 hours

REQUIRED PERFORMANCE STANDARDS:

- Demonstrates accurate knowledge of B & W film development process.
- Demonstrates ability to handle and develop exposed B & W film according to manufacturer's specifications.
- Prepares chemicals and darkroom correctly.
- Stores developing materials and maintains equipment according to manufacturer's specifications.
- Observes necessary safety measures.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.06 TITLE: Print Black and White Pictures.

INSTRUCTIONAL OBJECTIVE - 3.06: How to Print Black and White Pictures.

SKILLS: (Process Objectives)

How to:

3.061 - Make contact prints.
3.062 - Operate photograph enlarger.
3.063 - Use a magnasight.
3.064 - Use a densitometer.
3.065 - Mix, maintain, and use print chemicals.
3.066 - Process prints.
3.067 - Dry prints.
3.068 - Finish prints.
3.069 - Handle photographic prints.
3.0610 - Store B & W photographic prints and paper.
3.0611 - Maintain photo printing equipment.

RELATED TECHNICAL INFORMATION:

- Types of photographic paper.
- Manufacturer's specifications for operation and maintenance of photo printing equipment.
- Effect of light on photographic paper.
- Chemicals required for printing.

SUGGESTED INSTRUCTIONAL TIME: 3.06 - HS - 15 hours
(For planning only.) CC/TI - Architectural: 18 hours
Mechanical: 0 hours

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to make contact prints that are dried without curling and do ferrotype without spots.
- Student demonstrates ability to operate photo enlarger according to manufacturer's instructions and produce quality enlargements in acceptable time limits, free of dust.
- Student maintains photo printing equipment according to manufacturer's instructions.
- Student handles and stores photographic paper according to manufacturer's instructions.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.07 TITLE: Know Principles of Operation and Capabilities of Microfilm Process.

INSTRUCTIONAL OBJECTIVE - 3.07: To Learn Principles of Operation and Capabilities of Microfilm Process.

SKILLS: (Process Objectives)

3.071 - Learn basic principles of operation microfilm cameras.
3.072 - Learn basic principles of operation microfilm reader-printers.
3.073 - Learn photographic capabilities and limitations of microfilm process.
3.074 - Learn capabilities and limitation of microfilm 16mm and 35mm cameras.
3.075 - How to design a program to employ microfilm for proposed use.

RELATED TECHNICAL INFORMATION:

- Microfilm camera operator's manual.
- Microfilm reader-printer operator's manual.
- Microfilm storage requirements.
- Purpose of microfilming.
- Uses of microfilm.
- Purpose of microfilm reader-printer.

SUGGESTED INSTRUCTIONAL TIME: 3.07 - HS - 2 hours
(For planning only.) CC/TI - Architectural: 2 hours
Mechanical: 2 hours

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to explain basic principles of operation of microfilm camera and reader-printer with 80% accuracy.
- Student demonstrates ability to explain the primary capabilities and limitations of the microfilm process with 80% accuracy.
- Student demonstrates knowledge of purpose of microfilming and how to design a simple program to employ microfilm.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.08 TITLE: Make Microfilm Copies of Documents, Drawings and Plans.

INSTRUCTIONAL OBJECTIVE - 3.08: How to Make Microfilm Copies of Documents, Drawings, and Plans.

SKILLS: (Process Objectives)

How to:

3.081 - Prepare documents to be microfilmed.
3.082 - Operate microfilm unit:
  Load film unit
  Position copy and film unit for best format image
  Focus lens
  Adjust film unit for area to be photographed
  Make exposure test
  Calibrate exposure meter
  Perform special exposure control operation
  Set counter
  Make exposures
  Unload film unit
  Provide for humidity control
3.083 - Perform operator maintenance of microfilm unit.
3.084 - Operate automatic exposure control unit for planetary cameras.
3.085 - Operate microfilm reader-printer.
  Respond to alarms and safeguards
  Prepare for printing
  Make print
3.086 - Perform operational maintenance of reader-printer.
3.087 - Operate image control keyboard for microfilm reader-printer.
3.088 - Make microfilm so as to employ electronic keyboard counters.
3.089 - Proofread microfilm.
3.0810 - Print-test microfilm.
3.0811 - Make microfische.
3.0812 - Splice microfilm.
3.0813 - Identify and log microfilm.
3.0814 - Duplicate microfilm.

RELATED TECHNICAL INFORMATION:

- Manufacturer's equipment operating instructions.
- Impact of positive and negative page problems.
- Effect of heat, humidity and voltage changes on microfilm camera operations.
- Effect of static and dust on microfilm camera operations.
- Need for document security.
- Film storage and film life.
- Reorder procedures for spare parts.
- Purpose of image control keyboard.
- Purpose of automatic exposure control unit for planetary cameras.

SUGGESTED INSTRUCTIONAL TIME: 3.08 - HS - 15 hours
(For planning only.) CC/TI - Architectural: 20 hours
Mechanical: 20 hours

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates proper procedures in preparing document for microfilming.
- Student prepares and operates microfilm camera following correct steps in sequence as prescribed in manufacturer's manual. Produces clear, sharp images on film.
- Student can perform operator maintenance of microfilm camera according to manufacturer's manual.
- Student states correctly purpose of automatic exposure control unit for planetary cameras.
- Student demonstrates ability to operate microfilm reader-printer according to manufacturer's instructions.and produces a readable document.
- Student demonstrates ability to perform operator maintenance of reader-printer according to manufacturer's instructions.
- Student operates image control keyboard for microfilm reader-printer according to manufacturer's instructions.
- Student can demonstrate how to proofread and print-test microfilm.
- Student demonstrates ability to develop and maintain a workable and efficient microfilm identification and logging system.
- Student can state with 80% accuracy the effect of heat, humidity, voltage changes, static and dust on microfilm camera operation.

Note 1: The material for microfilm instruction was provided by Mrs. Christine W. Williams - Register of Deeds, Duplin County, North Carolina.

Note 2: The instructional portion applies specifically to Eastman Kodak Company Microfilm Cameras and Reader-Printers which are most common in North Carolina; however, it is equally applicable to other equipment such as made by 3M Company.

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes (con't.)

TASK NUMBER: 3.09 TITLE: Reproduce Documents Using Electrostatic Type Equipment.

INSTRUCTIONAL OBJECTIVE - 3.09: How to Reproduce Documents Using Electrostatic Type Equipment.

SKILLS: (Process Objectives)

How to:

3.091 - Operate electrostatic copier (set for length of copy, number, adjust intensity, start, reduce jams, etc.).
3.092 - Reload copier paper (roll type).
3.093 - Add toner (IBM) or like material where appropriate.
3.094 - Prepare machine to make offset press masters.
3.095 - Perform operator care of equipment.
3.096 - Copy single and multiple sheet originals.
3.097 - Make copies of material on rolls.
3.098 - Make copies of material in books.

RELATED TECHNICAL INFORMATION:

- Types of electrostatic copiers and principles of operation.
- Copier key operator's manual.
- Supply requirements.
- Legal information regarding limits on material that may be copied.

SUGGESTED INSTRUCTIONAL TIME: 3.09 - HS - 2 hours
(For planning only.) CC/TI - Architectural: 2 hours
Mechanical: 2 hours

REQUIRED PERFORMANCE STANDARDS:

- Student can make clear, bright copies in number required with no streaks or marks not on original from different types of originals (single and multiple sheet, rolled or bound).
- Student can reload copier and add toner as required according to operator's manual.
- Student can perform operator care of copier according to operator's manual.
- Student can reduce machine jams authorized for operator according to manufacturer's manual.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK:

3.011 Student will list (identify) five different standard reproduction processes employed by equipment commonly found in graphic communications activities.
Standard: Student lists (identifies) four of five processes correctly (80%).

3.012 Student will list (identify) five different types of reproduction equipment (by process employed, using trade or common name) commonly found in graphic communications activities.
Standard: Student lists five types of reproduction equipment with 80% accuracy.

3.013 Student will state how material (copy) produced by five different reproduction processes are commonly employed as graphic communications.
Standard: Student states at least 80% of the reproduction material uses correctly.

3.021 Given a Diazo machine, the student will identify five primary operating components and state their purpose.
Standard: Identification and purpose stated with 80% accuracy.

3.022 State the reproduction capabilities of a Diazo type machine as follows:

a. Color variations of copy.
b. Speed of reproduction (copies per minute).
c. Common sizes of copy (minimum to maximum).
d. Preparation required of master copy prior to reproduction to include type of material upon which master copy is made.

Standard: Capabilities stated with 80% accuracy.

3.023 Student will comment on requirements for the following as pertain to Diazo machines:

a. Safety considerations
b. Storage requirements for Diazo paper.

Standard: Student responses to a and b above are clear and accurate (100%).

3.03 Given a Diazo type reproduction machine and reproduction job order the student will:

a. Demonstrate ability to prepare machine for operation.
b. Select proper paper for job.
c. Produce desired copy.
d. Trim copy as required.
e. Perform operator maintenance.
f. Store paper correctly.

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK:

3.03 Standard:
- a. Follows manufacturer's operating manual.
- b. Selects best paper for requirement.
- c & d. Produces number and size of copy specified in job order; copy image sharp and even with proper color intensity.
- e. Performs requirements required by operator's manual correctly.
- f. Stores paper according to manufacturer's instructions.

3.04 Given a set of black and white photographic equipment (camera, lights, meters, lenses, etc.), the student will:

- a. Describe the basic principles of the photographic process.
- b. Identify five major items of photographic equipment and state purpose.
- c. Set up equipment to photograph a still life object using artificial light to obtain view(s), and effect and composition specified by instructor.
- d. Describe and state use of common types of black and white film.
- e. Photograph object in "c" above as directed.
- f. Take outdoor pictures of object(s) with composition specified by instructor with distant, mid-range, and closeup views.
- g. State storage life of B & W photo film.
- h. Demonstrate proper user care and maintenance for equipment items.

Standards:
- a. 100% accuracy.
- b. 80% accuracy.
- c. Performs task correctly (90%) following equipment manufacturer's instructions. Object centered unless otherwise specified.
- d. Responds with 90% accuracy.
- e. Follows prescribed procedures, uses equipment correctly, takes desired views, obtains photographs with proper focus, exposure, composition and background, with sharp clear images, etc., producing commercial copy.
- f. Same as e (above) except for object; observes shadow considerations and light effect.
- g. States storage life of B & W film correctly.
- h. Performs user equipment maintenance and care according to manufacturer's specifications.

3.05 Given a requirement to develop black and white photographic film, the student will:

- a. Describe the basic principles of B & W film development process.
- b. Demonstrate how to prepare to develop film:
  - prepare chemicals.
  - prepare equipment.
  - place undeveloped film on reel.
  - dark room preparation.
- c. Demonstrate film processing procedures.
  - process film.
  - dry film.
  - observe safety and light precautions.
  - clean-up procedures.

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER 3.0 TITLE: Reproduction Processes

TASK:

3.05 d. Demonstrate proper user maintenance of developing equipment and chemical storage.

Standards:
- a. Description is accurate and clear.
- b. Performs tasks according to material and equipment manufacturer's specifications. Observes light and safety precautions in preparing dark room.
- c. Performs tasks as prescribed by photographic processing manual. Exercises proper care in handling and drying processed film. Observes necessary light and safety precautions.
- d. Performs task according to manufacturer's specifications.

3.06 Given photographic printing equipment, several types of paper, job order and processed B & W film, the student will:

- a. Describe types and purpose of each type of photographic paper displayed.
- b. Prepare equipment to print according to printing requirements stated in job order.
- c. Prepare printing chemicals and bath for use.
- d. Print photographs as required by job order.
- e. Demonstrate correct print drying procedures.
- f. Demonstrate correct photo finishing and handling procedures.
- g. Demonstrate how to maintain printing equipment, clean-up print area, store chemicals and film.

Standards:
- a. Correctly identifies, describes characteristics and purpose of 80% or more of photo print paper displayed.
- b. Prepares equipment for use according to operator's manual and job order. Lenses free of dust.
- c. Prepares chemicals and print room as prescribed in manufacturer's manual.
- d. Prints photos in sizes, with special effects and on paper as specified in job order. Equipment operated according to manufacturer's specifications.
- e. Follows drying instructions - no water spots.
- f. Finishes photograph according to instructions.
- g. Follows equipment manufacturer's operator maintenance instructions. Cleans up print area correctly. Stores paper as required by manufacturer.

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK:

3.07
- a. The student will state the basic principles of microfilm camera operation.
- b. The student will state the basic principles of operation for microfilm reader-printers.
- c. The student will state the normal limits and capabilities of the microfilm process.
- d. The student will state the differences in capabilities of the 16mm vs 35mm microfilm camera.
- e. Given a requirement to reproduce certain types of documents on microfilm for storage and reference purposes, the student will design a program to accomplish the task. Equipment requirements and workspace will be stated by student in plan.

Standard:
- a. Student can state basic principles of microfilm camera operation with 80% acuuracy.
- b. Student can state basic principles of reader-printers with 80% accuracy.
- c. Student can state limits and capabilities of microfilm process.
- d. Student will state the differences in capabilities of the 16mm vs 35mm microfilm camera with 90% accuracy.
- e. The student prepares a plan to include equipment for microfilming the specified documents that will accomplish job with 85% accuracy.

3.08 Given a microfilm camera unit, microfilm reader-printer, automatic exposure control unit for planetary cameras, image control keyboard for microfilm reader-printer, with necessary support equipment, plus objects to be microfilmed and film, the student will be required to:

- a. State purpose of microfilming.
- b. Prepare a document for microfilming.
- c. Prepare microfilm camera unit for operation, position copy, operate automatic exposure control unit for planetary cameras and make exposure.
- d. Perform operator maintenance of microfilm camera unit.
- e. Operate microfilm reader-printer (prepare for printing and print microfilm).
- f. Perform microfilm reader-printer operator maintenance.
- g. Operate image control keyboard for reader-printer to retrieve a specified microfilm copy.
- h. Proofread microfilm.
- i. Print test microfilm.
- j. Splice microfilm.
- k. Identify and log microfilm.
- l. Explain impact of following and preventive measures or adjustments required on making microfilm:
  - Impact of positive and negative page problems.
  - Effect of heat, humidity and voltage changes.
  - Effect of static and dust on camera.
  - Need for document security.

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK:

3.08 Standard:
- a. States microfilm purpose clearly and accurately.
- b. Follows document preparation required for type, size, bound/unbound, age, color of background, color of print, clarity of text and images, cleanliness of document, etc.
- c. Prepares camera unit and automatic exposure control unit for planetary cameras for operation according to manufacturer's operators manual. Adjusts film unit for area to be photographed, makes exposure test, sets counters, focuses lens and makes exposure.
- d. Performs operator maintenance according to manufacturer's operating manual.
- e. Operates microfilm reader-printer according to manufacturer's instructions, observes alarms and safeguards in preparation for printing microfilm. Prints microfilm to obtain document in focus clear sharp print - full frame.
- f. Performs operator maintenance of reader-printer according to manufacturer's operating manual.
- g. Operates image control keyboard correctly and retrieves microfilm of specified object on first try.
- h. Proofreads microfilm to ensure copy was made as required, using equipment according to instruction in manual.
- i. Print tests microfilm according to operator's manual.
- j. Spliced film is smooth, strong and does not overlap two different frames. See operator's manual.
- k. Follows recommended procedures for identifying and logging microfilm.
- l. Can explain accurately (90%) the impact and effect of the external influences on microfilm photography.

3.09 Given a common, standard type electrostatic copier, a document and a bound book to be copied, the student will:

- a. Load machine with copier paper.
- b. Make check to ensure machine is ready to use.
- c. Prepare copy controls to ensure machine will print number and size of first quality copies required. State purpose of each control.
- d. Print quality copy - single sheet, from document provided.
- e. Print quality copy from bound book as directed.
- f. Describe basic principles of electrostatic copier machine operation.
- g. Demonstrate electrostatic copier operator maintenance requirements and how to reduce paper feed jam.
- h. State types of documents and material which legally should not be reproduced on a copier.

Standards:
- a. Uses proper paper and loads machine according to manufacturer's instructions.
- b. Follows pre-operation checks as prescribed in operator's manual (90%).
- c. Sets copier controls as required for job and the document to be copied according to operator's manual. States purpose of each control accurately (90%).

TEST ITEMS (Con't.)

BLOCK OR DIVISION NUMBER: 3.0 TITLE: Reproduction Processes

TASK:

3.09 Standard:

d. Prints copy that is centered, no margin streaks, bright, clear print, paper proper length for original and in specified number of copies.
e. Prints copy that is centered and all text of page legible, following operator's manual.
f. Describes basic principles of electrostatic copier machine operation with 80% accuracy.
g. Performs operator maintenance according to copier machine operator's manual.
h. States legal limits on types of documents that can be copied with 90% accuracy.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphic Communications)

COURSE: Freehand Drawing and Sketching (Block 4.0)

COURSE DESCRIPTION: Department of Public Instruction: N/A
Department of Community Colleges: CAT 1100 (Sketching and Drawing)

INSTRUCTIONAL HOURS: High Schools - 90 hours*
CC/TI - 33 hours*

INSTRUCTIONAL OBJECTIVES:

1. To provide the student with information as to application and advantages of freehand sketching in graphic communications.
2. To provide the student with the basic skills required to apply freehand sketching to the drawing of objects to communicate shape and composition from observation of subject, verbal descriptions or own mental image; using orthographic projections and pictorials.

JOB QUALIFICATIONS:

This block of instruction does not by itself provide initial entry job qualification skills. It is a component of the several duty areas in which competency is required for qualification at the basic level in the field of graphic communications, to include drafting.

PREREQUISITES:

Knowledge of orthographic projection and shape description (Block 1.0)

(Note: It is desirable that student have Block 1.0 instruction prior to this course; the alternative is that Block 1.0 and this block be conducted concurrently.)

PERFORMANCE EVALUATION:

See test items attached. Emphasis is on competency based evaluation.

EQUIPMENT:

See attached equipment list.

*Note: This is the time allocated to initial instruction in the basic skills required for freehand sketching and drawing. Additional time with emphasis on application of this skill is provided in Block 5.0 and in the advanced program drafting specialties.

BLOCK OR DIVISION NUMBER: 4.0 TITLE: Freehand Drawing and Sketching

TASK NUMBER: 4.01 TITLE: Know Advantages of Freehand Sketching and Drawing.

INSTRUCTIONAL OBJECTIVE - 4.01: To Learn Advantages of Freehand Sketching and Drawing.

SKILLS: (Process Objectives)

4.011 - Know applications of freehand sketching.
4.012 - Know advantages of freehand sketching.

RELATED TECHNICAL INFORMATION:

- Observation and awareness requirements for freehand sketching.

SUGGESTED INSTRUCTIONAL TIME: 4.01, HS - 4 hours; CC/TI - 2 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Can state accurately the applications and advantages of freehand drawing and sketching.

BLOCK OR DIVISION NUMBER: 4.0 TITLE: Freehand Drawing and Sketching (con't.)

TASK NUMBER: 4.02 TITLE: Sketch Freehand to Communicate Shape and Composition

INSTRUCTIONAL OBJECTIVE - 4.02: How to Sketch Freehand to Communicate Shape and Composition.

SKILLS: (Process Objectives)

How to:

4.021 - Apply techniques of sketching lines (line definition).
4.022 - Apply techniques of sketching shapes.
4.023 - Apply techniques of sketching tones and textures.
4.024 - Apply techniques of proportioning.
4.025 - Apply techniques of determining composition.
4.026 - Apply techniques of sketching from subject.
4.027 - Apply techniques of sketching from verbal or own mental image.

RELATED TECHNICAL INFORMATION:

- Paper requirements.
- Pencil applications.
- Charcoal applications.
- Pens (felt tip and regular) applications.
- Types of geometric figures.

SUGGESTED INSTRUCTIONAL TIME: 4.02, HS - 45 hours; CC/TI - 16 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Can sketch accurately, employing stated techniques to communicate a specified object (real or imaginary).

BLOCK OR DIVISION NUMBER: 4.0 TITLE: Freehand Drawing and Sketching (con't.)

TASK NUMBER: 4.03 TITLE: Sketch Objects Using Orthographic Projections and Pictorials.

INSTRUCTIONAL OBJECTIVE - 4.03: How to Sketch Objects Using Orthographic Projections and Pictorials.

SKILLS: (Process Objectives)

How to:

4.031 - Apply theory of orthographic projection and pictorials to freehand sketching and drawing.
4.032 - Apply techniques learned in instructional objective 4.02.
4.033 - Apply skills acquired in Block 1.0 pertaining to obliques and perspectives.

RELATED TECHNICAL INFORMATION:

- Types of projections.
- Paper requirements.
- Sketching materials.
- Types of geometric figures.

HS - 40 hours;
SUGGESTED INSTRUCTIONAL TIME: 4.03, CC/TI - 15 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to sketch freehand a specified object using orthographic and pictorial methods.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 4.0 TITLE: Freehand Drawing and Sketching

TASK:

4.01 Given a situation which will require an object to be presented by freehand sketch drawing, the student will state the applications and advantages of freehand sketching and drawing.
Standard: Applications and advantages of freehand sketching stated are accurate and valid.

4.02 Given a requirement to communicate shape and composition of an object by freehand sketching and drawing, the student will apply the following sketching techniques to perform task:

a. Sketch lines (line definition).
b. Sketch shapes.
c. Sketch tones and textures.
d. Determine composition.
e. Sketch from subject (observation).
f. Sketch from written or verbal or own mental image.

Standards: Student applies techniques a through d with 80% accuracy and performs task so that object is recognizable and work neat in reasonable time limits.

4.03 Given a requirement to sketch and draw freehand an object using orthographic projections and pictorials, the student will demonstrate ability to:

a. Apply theory of orthographic projection and pictorials to freehand sketching.
b. Apply skills pertaining to obliques and perspectives to freehand sketching.

Standard: Student performs task neatly in reasonable time while demonstrating ability to use orthographic projections and pictorials with 85% accuracy.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphic Communications)

COURSE: Graphic Composition (Block 5.0)

COURSE DESCRIPTION: Department of Public Instruction: Included in T & I 7792
(Graphics and Industrial Communication II)
Department of Community Colleges: CAT 1109 (Composition)
INSTRUCTIONAL HOURS: High Schools - 45 hours*
CC/TI - 33 hours*

INSTRUCTIONAL OBJECTIVES:

1. To provide the student with the ability to define and identify elements of graphic composition.
2. To provide the student with the ability to control composition of graphics jobs using various elements of graphic composition.

JOB QUALIFICATIONS:

Successful completion of this block of instruction is essential to acquisition of initial entry job skills for qualification at the lowest job level in the general field of graphic communications. It is part of a series of instructional blocks required for job qualification and does not provide D.O.T. identifiable job qualification by itself.

PREREQUISITES:

Basic Technical Drafting (Block 1.0) and Freehand Sketching and Drawing (Block 4.0)

PERFORMANCE EVALUATION:

See test items attached. Emphasis is on competency based evaluation.

EQUIPMENT:

See attached equipment list.

*Note: This is the time allocated to initial instruction in the basic skills required for Graphic Composition. Additional time for emphasis on application of this skill is provided in the advanced program drafting specialties.

BLOCK OR DIVISION NUMBER: 5.0 TITLE: Graphic Composition

TASK NUMBER: 5.01 TITLE: Identify and Define Elements of Graphic Composition

INSTRUCTIONAL OBJECTIVE - 5.01: How to Identify and Define Elements of Graphic Composition.

SKILLS: (Process Objectives)

5.011 - Know definition of elements of graphic composition.
5.012 - How to identify elements of graphic composition.

RELATED TECHNICAL INFORMATION:

- Definition of graphic composition.
- Effect of elements of graphic composition on composition.

SUGGESTED INSTRUCTIONAL TIME: 5.01, HS - 8 hours; CC/TI - 6 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Can identify accurately (80%) elements of graphic composition.
- Can define accurately by (80%) the elements of graphic composition.

BLOCK OR DIVISION NUMBER: 5.0 TITLE: Graphic Composition (con't.)

TASK NUMBER: 5.02 TITLE: Control Graphic Compositions Using Elements of Composition.

INSTRUCTIONAL OBJECTIVE - 5.02: How to Control Graphic Compositions Using Elements of Composition.

SKILLS: (Process Objectives)

How to:

5.021 - Control composition using location.
5.022 - Control composition using form.
5.023 - Control composition using hue.
5.024 - Control composition using size.
5.025 - Control composition using value (intensity).
5.026 - Control composition using direction.
5.027 - Control composition using symmetry and balance.

RELATED TECHNICAL INFORMATION:

- Color charts and graphs.
- Intensity charts.
- Value charts and graphs.
- Technical manuals.
- Supply manuals.
- Effect of elements of composition on composition.

HS - 36 hours;
SUGGESTED INSTRUCTIONAL TIME: 5.02, CC/TI - 27 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to define and identify elements of composition (80%).
- Student demonstrates ability to correctly control composition using elements of :
    - Size
    - Location
    - Form
    - Hue
    - Value
    - Direction
    - Intensity
    - Symmetry and Balance
- 80% accuracy.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 5.0 TITLE: Graphic Composition

TASK:

5.01 Given a requirement to define elements of composition and identify the elements of composition used on a specified graphic communication presentation, the student will:

a. Define in writing the elements of graphic composition.
b. Identify the elements of composition as employed on the specified composition.

Standards: Student defines in writing the elements of composition with 80% accuracy. Student identifies with 80% accuracy the elements of graphic composition as applied on the graphic presentation.

5.02 Given a graphic communication presentation requirement with a provision to control composition using the various elements of composition, the student will control composition using six of seven elements to control composition listed below:

a. Location.
b. Form.
c. Hue.
d. Size.
e. Value (intensity).
f. Direction.
g. Symmetry and balance.

Standard: Student demonstrates ability to apply control of composition with six elements selected with 80% accuracy.

5.02 Given a series of color charts, intensity charts, value charts and graphs that apply to the control elements of graphic communications, the student will demonstrate ability to use such items to assist in applying elements of composition to control of composition.
Standard: Student uses correct charts and graphs properly for the element of control being applied to control the composition.

ARTICULATION RESEARCH PROJECT

INSTRUCTIONAL GUIDE

PROGRAM: Drafting (Graphic Communications)

COURSE: Lettering (Graphic Communications) (Block 6.0)

COURSE DESCRIPTION: Department of Public Instruction - See T & I Course 7551 and 7552.
Department of Community Colleges - CAT 1126 (Lettering)

INSTRUCTIONAL HOURS: High Schools - 45 hours*
CC/TI - 33 hours*

INSTRUCTIONAL OBJECTIVES:

To provide the student with the primary skills to letter freehand and use the various devices and transfer types of lettering procedures applied in graphic communications.

JOB QUALIFICATIONS:

No specific job qualification is acquired by successful completion of this block of instruction. Acquisition of these skills and related information are essential to the basic requirements for initial entry job qualification.

PREREQUISITES:

None

PERFORMANCE EVALUATION:

See test items attached. Emphasis is on competency based evaluation.

EQUIPMENT:

See attached equipment list.

*Note: This is the time allocated to initial instruction in the basic skills required for Lettering. Additional time with emphasis on application of this skill is provided in the advanced program drafting specialties.

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communications)

TASK NUMBER: 6.01 TITLE: Letter Freehand.

INSTRUCTIONAL OBJECTIVE - 6.01: How to Letter Freehand.

SKILLS: (Process Objectives)

6.011 - Know different styles, types and techniques of freehand lettering most commonly used and when to use each.
6.012 - How to letter freehand and apply appropriate techniques.

RELATED TECHNICAL INFORMATION:

- Types of materials used in lettering.
- Style charts and letter types.

SUGGESTED INSTRUCTIONAL TIME: 6.01, HS - 20 hours; CC/TI - 15 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Student can identify different freehand lettering techniques, most commonly used types and styles and when used at 80% accuracy.
- Demonstrates ability to letter freehand most common types and styles of letter, accurately, with proper letter proportions and neatness considerations applied.

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communications) (con't.)

TASK NUMBER: 6.02 TITLE: Letter Using Transfer and Pressure Sensitive Letters.

INSTRUCTIONAL OBJECTIVE - 6.02: How to Letter Using Transfer and Pressure Sensitive Letters.

SKILLS: (Process Objectives)

6.021 - How to use transfer and pressure sensitive letters.

RELATED TECHNICAL INFORMATION:

- Supply catalogues.
- Manufacturer's instructions.

SUGGESTED INSTRUCTIONAL TIME: 6.02, HS - 2 hours; CC/TI - 2 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Demonstrates ability to use correctly and neatly transfer and pressure sensitive letters as required.

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communications) (Con't.)

TASK NUMBER: 6.03 TITLE: Letter Using Mechanical Devices.

INSTRUCTIONAL OBJECTIVE - 6.03: How to Letter Using Mechanical Devices.

SKILLS: (Process Objectives)

How to:

6.031 - Use Leroy type lettering devices.
6.032 - Use Ames type lettering devices.

RELATED TECHNICAL INFORMATION:

- Supply catalogues.
- Manufacturer's manuals.

SUGGESTED INSTRUCTIONAL TIME: 6.03, HS - 10 hours;
CC/TI - 8 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Demonstrates ability to use correctly and neatly Leroy and Ames type lettering devices to produce lettering for specific jobs.

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communications) (Con't.)

TASK NUMBER: 6.04 TITLE: Letter Using Templates.

INSTRUCTIONAL OBJECTIVE - 6.04: How to Letter Using Templates.

SKILLS: (Process Objectives)

6.041 - How to use templates to letter.

RELATED TECHNICAL INFORMATION:

- Types of templates available.
- Care of templates.

SUGGESTED INSTRUCTIONAL TIME: 6.04. HS - 6 hours; CC/TI - 4 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to correctly use proper templates to meet lettering requirements and produce a neat and accurate job.

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communication) (Cont.)

TASK NUMBER: 6.05 TITLE: Letter Using Photographic Processes.

INSTRUCTIONAL OBJECTIVE - 6.05: How to Letter Using Photographic Processes.

SKILLS: (Process Objectives)

How to:

6.051 - Use phototypositor for lettering.
6.052 - Use headliner for lettering.
6.053 - Maintain phototypositor and headliner.

RELATED TECHNICAL INFORMATION:

- Manufacturer's manuals.
- Supply requirements and storage procedures.
- Supply catalogues.
- Types of lettering produced by equipment.

SUGGESTED INSTRUCTIONAL TIME: 6.05, HS - 6 hours; CC/TI - 4 hours. (For planning only.)

REQUIRED PERFORMANCE STANDARDS:

- Student demonstrates ability to produce correctly lettered job in reasonable time using phototypositor.
- Student demonstrates ability to produce correctly lettered job in reasonable time using headliner.
- Student demonstrates ability to maintain equipment and store material according to manufacturer's specifications.

TEST ITEMS

BLOCK OR DIVISION NUMBER: 6.0 TITLE: Lettering (Graphic Communications)

TASK:

6.01 Given a display of a series of examples of various types, styles and techniques of freehand lettering commonly used in graphic communication the student will: Identify in writing the types, styles and techniques of lettering displayed.
Standard: Student identifies 80% of the lettering displayed accurately.

6.01 Given a requirement to letter freehand several types and styles of letters and apply specific lettering techniques to a designated job, the student will demonstrate ability to select and letter freehand two types of lettering in two styles, applying a common lettering technique selected by the instructor.
Standard: Types and styles of lettering appropriate for job; all letters correctly formed and proportioned; technique applied correctly; time limits, reasonable; neatness applies.

6.02 Given a variety of transfer and pressure sensitive type commercial letters, to be used on a designated graphic communication, the student will demonstrate ability to select and use the correct letters for job.
Standard: Letters correctly and neatly applied (90%); letters selected are appropriate for the job; all words are spelled correctly (100%); punctuation is correct (100%).

6.03 Given a lettering job with a requirement to use a common mechanical lettering device the student will: Demonstrate ability to select and use the correct mechanical lettering items for the job.
Standards: Lettering type, style, size, etc., appropriate for job; words spelled correctly with proper punctuation; letter and word spacing is correct; lettering is neat and performed in a reasonable time limit.

6.04 Given a set of lettering templates and a graphics job with a lettering requirement involving different styles and types of specified letters the student will: Letter the job selecting and using the templates required for specified styles and types of lettering.
Standard: Student selects correct templates for the job; student uses templates correctly, produces neat work, correctly spaced; production time is reasonable.

6.05 Given a graphics job order with a lettering requirement that can be satisfied by using a headliner or phototypositor to produce required letters the student will be required to:

a. Produce desired lettering as specified in the job order, using a phototypositor.
b. Produce lettering specified by the job order using a headliner.

Standards: The student uses phototypositor correctly producing desired letters, properly spaced with punctuation and spelling correct. Performs operator maintenance specified by manufacturer; Student uses headliner correctly to produce lettering specified in job order, properly spaced, with punctuation and spelling correct. Performs operator maintenance specified by manufacturer.

APPENDIX A

ARTICULATION RESEARCH PROJECT

DRAFTING (GRAPHIC COMMUNICATIONS) PART I (BASIC)

SUGGESTED EQUIPMENT LIST

For a school conducting a Vocational or Technical Drafting (Graphic Communications) Program based upon 18 student class size.

Quantity	Description
18	Practical drawing outfits including:
	1 - drawing instrument set
	24" x 36" wide vinyl drawing top covers (self-sealing)
	1-T-square, maple, clear plastic lined, 30"
	1 - triangle, 30° x 60°, plastic 10"
	1 - triangle, 45°, plastic 10"
	1 - adjustable triangle
	1 - scale, architect's triangular, engine divided
	1 - engineer's scale
	1 - mechanical scale
	1 - protractor, plastic, semi-circular
	1 - set of plastic curves
	1 - adjustable curve
	1 - roll 3/4" drafting tape
	2 - lead holders
	1 - eraser, vinyl
	1 - electric eraser, plug-in type
	1 - sandpaper pad pencil pointer
	1 - ink, black, 3/4 oz. bottle
	5 - sets rapid-o-graph (complete sets)
	1 - instruction book on "Use and Care of Drawing Instruments"
	1 - lettering chart
	3 - H heads
	2 - 4-H heads
	1 - tube compass lead
18	Bench dusters
3	Drafting machines
1	Proportional divider
1	Compass beam
1	Compass, drop bow pen and pencil
1	Caliper, inside
1	Diazo machine
1	Paper cutter (Min-36" blade)
1	Shears, trimming, 12"
2	Pencil sharpeners
*18	Drafting tables w/stools, 6-drawer storage unit (24" x 36" top)
1	Light table
1	Bookcase, 37"w x 12"d x 86"h
1	Storage cabinet with lock, 80" x 36" x 18"

*Note: This equipment recommended for High School only. Professional size drafting tables recommended for CC/TI.

APPENDIX A (con't.)

Equipment List (con't.)

Quantity	Description
1	Table, library 30" x 60"
1	Filing cabinet with lock, 5-drawer full suspension legal size
1	Overhead projector with screen
1	Opaque projector
1	Chalkboard drafting machine
18	Mechanical lead pointers
1	Drafting pencil sharpener
1	Film strip projector with cassette tape
1	Stapler and remover
1	5-drawer drawing file (50 5/16" x 38 1/2" x 2 1/2" drawer)
1	Drawing file closed base - 6" high
1	Set blackboard drawing instruments including large 30° x 60° triangle and large compass
1	Lettering set (mechanical)
18	Sets lettering Templates
1	Headliner
1	Phototypositor

Black and White Photography (Develop and Print)

Quantity	Description
1	Photo enlarger
1	Contact frame
1	Densitometer
1	Print paper drier
1	Magnasight
4	Developing trays
1	Darkroom for film developing
1	Wash tank
3	Film tanks
3	Film reels
1	Film drier
1	35mm camera with lenses and filters
1	Light meter
1	Polaroid camera
1	Set of flood lights

Microfilm Photography

Quantity	Description
1	Darkroom for camera work
1	Microfilm camera unit-35mm (16mm optional)
1	Reader-Printer Unit
1	Automatic Exposure Control Unit for Planetary Cameras
1	Image control keyboard
1	Film loader
2	Film storage cabinets
1	Film loading station
1	Film inspection station

Electrostatic Copier

Quantity	Description
1	Electrostatic copier (available for instruction)

APPENDIX B

"SUGGESTED SAMPLE"

ARTICULATION RESEARCH PROJECT

STUDENT VOCATIONAL SKILLS RECORD

COURSE: PROBLEM SOLVING IN GRAPHICS, BLOCK 2.0

(FOR INSTRUCTOR'S FILE)

NAME: ______________________________ DATE: ______________

CERTIFIED BY: ________________________ TITLE: ______________

INSTITUTION: ____

CODE	TASKS
(U L M S)	Define the Problem.*
(U L M S)	Identify problem limits.*
(U L M S)	Use technical literature in developing a research base for the problem.*
(U L M S)	Analyze available related information and select problem solving method.*
(U L M S)	Design and implement a strategy for experimental purposes.*
(U L M S)	Analyze and record results of experimental strategy.*
(U L M S)	Have an alternate strategy if first choice does not work.*
(U L M S)	Summarize and present the sequence of events and steps utilized in problem solving from definition to solution.*

GENERAL ATTITUDE

(U L M S)	Industrious and energetic
(U L M S)	Cooperative with associates and instructors
(U L M S)	Dependable
(U L M S)	Punctual

CODE - CIRCLE APPROPRIATE LETTER

U - Unqualified
L - Limited skill, requires supervision
M - Moderate skill, required minimum supervision
S - Skilled, works independently

*These are the tasks as shown in the task listing.

A STATE ARTICULATED INSTRUCTIONAL OBJECTIVES GUIDE

(STATE PILOT MODEL)

FOR

DRAFTING (GRAPHIC COMMUNICATIONS)

PART II - SPECIALTY PROGRAMS

SECTION - A (MECHANICAL DRAFTING PROGRAMS)

DEPARTMENT OF COMMUNITY COLLEGES

MECHANICAL DRAFTING AND DESIGN	(T-043)
MECHANICAL DRAFTING	(V-017)

DEPARTMENT OF PUBLIC INSTRUCTION

MECHANICAL DESIGN III (T&I 7573(Y-2))

JULY 1978

PREPARED BY

ARTICULATION OF OCCUPATIONAL EDUCATION PROGRAMS BETWEEN
SECONDARY SCHOOLS AND TECHNICAL INSTITUTES/
COMMUNITY COLLEGES PROJECT

A JOINT RESEARCH PROJECT SPONSORED BY
THE NORTH CAROLINA STATE DEPARTMENT OF PUBLIC INSTRUCTION
AND
THE NORTH CAROLINA STATE DEPARTMENT OF COMMUNITY COLLEGES

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ARTICULATION RESEARCH PROJECT
PROGRAM SUMMARY

DRAFTING (GRAPHIC COMMUNICATIONS)
PART II - SPECIALTY PROGRAMS

PROGRAM: Mechanical Drafting and Design
Mechanical (Industrial) Drafting

PROGRAM NUMBER: Department of Community Colleges - T-043 & V-017
Department of Public Instruction - No Program
(T&I 7573 is the high school drafting course with related drafting program content)

DRAFTING COURSES AND COURSE NUMBERS:

TECHNICAL DRAFTING II - BLOCK 102 (Tolerancing, Dimensions and Notes, Shop Processes, Revolutions, Intersections and Developments, Measuring Devices) (This block of instruction includes the contents of courses identified as DFT 102 and DFT 1192 and part of T&I 7573(Y-2).)

TECHNICAL DRAFTING III - BLOCK 103 (Threads, Fasteners, Motion Transfer and Welding Representations) (This block of instruction includes the contents of courses identified as DFT 103, DFT 1190 and T&I 7573(Y-2).)

DESCRIPTIVE GEOMETRY - DCC DFT 204 and DFT 1125

DESIGN DRAFTING I - BLOCK 205 (Preliminary Drawings) (This block of instruction includes the contents of courses identified as DFT 205 and DFT 1171.)

DESIGN DRAFTING II - BLOCK 206 (Working/Production Drawings) (This block of instruction includes the contents of courses identified as DFT 206 and DFT 1193.)

MECHANISMS(*) - BLOCK 211 (This block of instruction includes the contents of courses identified as DFT 211.)

JIGS & FIXTURES DESIGN - BLOCK 212 (This block of instruction includes contents of courses identified as DFT 212 and DFT 1191.)

DESIGN DRAFTING III - BLOCK 223 (Punches and Dies, Electro-Mechanical, Printed Circuits) (This block of instruction includes contents of courses identified as DFT 223 and DFT 1191.)

PART II - PROGRAM INSTRUCTIONAL CONTACT HOURS, DRAFTING COURSES ONLY:
DCC - 1 year - 435*, 2 year - 435*, DPI - 360

*Note: Included as an elective in program concerned.

INSTRUCTIONAL OBJECTIVES, PART II - SPECIALTIES:

Suggested Instructional Time By Course - In Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
BLOCK 102 2 Year - 66 1 Year - 66 HS - 180	Technical Drafting II - To provide job qualification competencies required to perform drafting tasks in the activity areas of tolerancing, dimensions and notes, shop processes; the application of revolutions, plus intersections and developments, and use of measuring devices. Job qualification performance standards will be applied.
BLOCK 103 2 Year - 99 1 Year - 99 HS - 180* (*See Note 1, BLOCK 103)	Technical Drafting III - To provide job qualification level competencies required to perform drafting tasks in the duty areas of drawing threads, fasteners and springs, welding representation, and motion transfer (cams, gears, pulleys and belts, sprockets and chains). Job qualification performance standards will be applied.
DCC DFT 204 & DFT 1125 2 Year - 55 1 Year - 55 HS - None	Descriptive Geometry - The purpose of this course is to provide the student with the ability to visualize and make graphic analyses of space problems involving points, lines, planes, connectors and the spatial relationship between them. Practical design problems will be stressed with analytical verification where applicable. The Le Systeme International d'Units (SI) Metric System Units is recommended for use with assigned problems.
BLOCK 205 2 Year - 88 1 Year - 88 HS - None	Design Drafting I - To provide job qualification competencies required to perform drafting tasks related to the activity or duty area of preparing preliminary drawings. Also included is application of problem solving procedures, model making, layout and design sketching skills acquired in Part I of this program. Use of handbooks, tables, ANSI and related manuals as references will be stressed. Problem solving application will be extended to include the preparation of written and oral engineer reports.
BLOCK 206 2 Year - 77 1 Year - 77 HS - None	Design Drafting II - To provide job qualification competencies required to perform drafting tasks in the duty area of preparing working drawings for reproduction. Blueprint reading competencies will be developed and the use of special drafting media and inking techniques covered. Job qualification performance standards will be applied. An orientation on Patent Drawing requirements is also provided.

INSTRUCTIONAL OBJECTIVES, PART II - SPECIALTIES:

Suggested Instructional Time By Course - In Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
BLOCK 211 2 Year - 55* 1 Year - 55* HS - None	Mechanisms - To provide the student with knowledge of basic terminology and concepts of mechanisms. To provide the student with the ability to develop both drafting room and mathematical solutions of problems involving the principles of machine elements. To provide the student with knowledge of the methods used to design gears, gear trains, cams, pulleys and belting.
BLOCK 212 2 Year - 55 1 Year - 55 HS - None	Jigs and Fixtures Design - To provide the student with job qualification competencies in drafting pertaining to: (a) knowledge of the principles involved in the design and production of common types of jigs and fixtures; (b) the application of jigs and fixtures; (c) knowledge of standard parts for jigs and fixtures; and (d) the practical application of theories and procedures in the design of Drill Jigs and Milling Fixtures.
BLOCK 223A 2 Year - 55 1 Year - 55 HS - None	Design Drafting III(A) - To provide the student with required basic introductory information and knowledge regarding the design procedures for (a) punch and die design; (b) electro-mechanical; and (c) printed circuit design.
BLOCK 223B 2 Year - 44* 1 Year - 44* HS - None	Design Drafting III(B) - As a continuation of 223A, to provide instruction and opportunity for application of acquired skills and related technical information leading to the competencies required for job qualification in the duty areas of (a) punch and die design and drafting; (b) electro-mechanical design and drafting; and (c) printed circuit design and drafting.

JOB QUALIFICATION SKILLS GAINED BY THE COMPLETION OF PART I AND PART II:

Successful completion of Part I (Basic) and Part II results in the following initial employment job qualifications (one to two years on the job experience is normally considered necessary for full qualification for upper level jobs), in addition to the 2 Year Program objective of Mechanical Drafting and Design Technician.

Program Title	1977 - D.O.T. Title & Number
T-043 - Mechanical Drafting and Design	Chief Drafter or Layout Drafter - 007.261-010
	Mechanical Drafter - 007.281-010
V-017 - Mechanical Drafting	Mechanical Drafter - 007.281-010
Note: Other potentials, both programs:	Drafter (Castings) - 007.261-014
	Drafter (Patent) - 007.261-018
	Drafter (Tool Design) - 007.261-022

PREREQUISITES:

Enrollment in the drafting specialties of Part II - Specialties is contingent upon successful completion of instruction required in Part I - Basic. Prerequisites for each individual course is shown upon the course summary sheet.

PERFORMANCE EVALUATION:

Evaluation should be by performance (Competency Based) testing. Test items should be task performance directed, to determine that the learner is job qualified to perform the job tasks organic to the duty area of activity related to the course of instruction. Performance standards applied should be those required to meet initial employment job requirements for the task concerned and the applicable standards manuals.

EQUIPMENT:

Drafting equipment normally found in a drafting room environment in local area industries. See also Appendix A, Part I - Basic.

ADJUSTMENTS TO INSTRUCTIONAL TIME ALLOCATIONS PROVIDED FOR BLOCKS OF INSTRUCTION CONTAINED IN THE INSTRUCTIONAL OBJECTIVES GUIDE TITLED - DRAFTING (GRAPHIC COMMUNICATIONS) - PART I - BASIC

Part I - Basic of this program is designed to provide for instruction that will develop the basic or fundamental skills or competencies required in most subsequent courses of the several programs related to drafting. Owing to the limitations in program available instructional contact time, it may be necessary to adjust the formal classroom/drafting room/laboratory/instructional time allocations for several of the blocks of instruction contained in Part I. This will require that the initial explanation, demonstration, discussion and preliminary applications only be conducted as formal course identified classes. The primary application and reinforcement phases of the competencies concerned should then be integrated or conducted concurrently with appropriate subsequent instruction in other courses of advanced (specialty) drafting to achieve job qualification competency.

The primary difference between the average 1 Year and 2 Year Programs in the Mechanical Drafting Specialty is that the 1 Year Program concentrates more on the manual drafting skills involved in each block of instruction and receives less of the theory. Two Year Programs cover both the manual drafting skills and the theory. Two Year students are required to have more mathematics, physical science and engineering subjects to achieve technician status.

PART II

DEVELOPMENT OF ARTICULATED SPECIALTY DRAFTING PROGRAMS

Section A - Mechanical Drafting and Design/Mechanical Drafting

The instructional content requirements for Drafting (Graphic Communications), Part I - Basic, was developed by the State Articulated Drafting Advisory and Program Committee. This committee as shown in Part I consists of drafting teachers/instructors and craft advisors. The articulated specialty drafting or advanced drafting programs (Architectural and Mechanical), shown in Part II, are based upon the Part I - Basic, which provides the essential instructional content guidance for the development of competencies in basic technical drafting, problem solving, reproduction, composition (layout), freehand sketching and drawing, and lettering. It was advisor consensus that the individual desiring to enter the drafting or related occupations should have a firm grasp of the competencies presented in Part I - Basic, prior to attempting to acquire competencies or skills in a drafting (graphic communications) specialty.

The specialty area of drafting presented in Section A, Part II is Mechanical Drafting. Shown are the proposed articulated drafting components for Mechanical Drafting and Design (T-043) and Mechanical Drafting (V-017) Programs offered by certain CC/TI. Section A is aligned with and recognizes the advanced specialty course titled Machine Design (T&I 7573(Y-2)) that is offered in many of the high schools. The instructional content is organized into blocks, showing titles and numbers used by the North Carolina CC/TI. The competencies which must be taught for the student to be considered job qualified in a particular drafting duty area are shown as tasks.

Tasks are those detail job functions or assignments which the worker normally performs and collectively make up the job. They may be initially grouped under headings to which they are related called duty areas. Duty areas and their subordinate tasks are identified and developed by performing a job analysis to obtain a Task Listing or Task Inventory. For instructional purposes, duty areas with a number of major tasks may become courses, whereas duty areas that have relatively few tasks which are not complex in nature may be identified as "blocks" and grouped with other related duty areas to provide an instructional course. The duty areas and tasks listed in the Mechanical Drafting Section of Part II were developed from a review of course outlines provided by Fayetteville Technical Institute, Forsyth Technical Institute, Central Carolina Technical Institute, Guilford Technical Institute, Piedmont Technical Institute, Western Piedmont Community College and Wayne Community College. Additional information was obtained from the Sanford, North Carolina Project and The Peninsula Vocational Education Center, Hampton, Virginia. An ERIC search was also conducted by the Education Information Center, State Department of Public Education. The ERIC search produced some excellent, very recent task inventories from Louisiana, Texas, Florida, Washington and Virginia.

All of the information from sources cited was synthesized to develop a series of courses compatible with general program guidance from the N.C. State Department of Community Colleges and current practice by institutions. The tasks which appeared to be taught by most institutions within each course are listed in the instructional task inventory. Those tasks which appeared to be complex in nature with many sub-tasks were identified as "modules", with the components listed under such a heading. A general statement regarding the performance standards to be applied is shown at the bottom of each course task inventory. A notation is made on each inventory to the effect that the individual instructor will be expected to perform a task analysis of each task listed to determine the skills and related technical information that must be taught for the student to be job qualified to perform the task.

Instructional procedures are determined by the individual instructor. The important aspect and reason for this instructional objectives guide is to ensure that the instructors and teachers participating in an articulation agreement teach the same tasks as instructional content and apply the same performance standards. The task becomes the instructional objective. If the local area craft advisors identify a task or tasks not shown in the task inventory, then by general agreement of the advisors and the teachers/instructors concerned, such task(s) should be added to the articulated task inventory for the appropriate course. This may require adding more time to the course or reducing time allocated to tasks that see little use in the local area. To attain lateral articulation between institutions of the same educational level and to ensure that graduates are qualified for employment as drafters outside of their local area, instructors should teach all tasks in the inventory until such a time as the inventory is changed and tasks deleted or added by the committee that developed it. These task listings have been reviewed by instructors and also should be reviewed by local area advisors to ensure that they are accurate and reflect current and future industry requirements.

It will be noted that the drafting content and instructional time allocations for the various drafting courses may exceed that offered by some institutions. Instructional time adjustments may be necessary to academic and technical courses that support the Mechanical Drafting and Design Program (2 Year) such as Calculus and Metallurgy II to ensure that sufficient time is provided for the drafting courses. An alternative is to require more contact hours per quarter of the student. Since the primary purpose of the program is to develop highly skilled drafters, who can perform the tasks required in the drafting room, the drafting requirements should have priority. The course instructional time allocation for the 1 Year Program is reasonably close to current practices and should not present a major problem.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Technical Drafting II

BLOCK/COURSE NUMBER: 102 - Includes Instructional Content Contained In Courses Identified As: (Community Colleges/Technical Institutes - DFT 102 and DFT 1192) (Department of Public Instruction - Part of T&I 7573(Y-2))

INSTRUCTIONAL CONTACT HOURS (Recommended):
66 Hours - 2 Year Program
66 Hours - 1 Year Program
180 Hours - HS (Additional time may be available if BLOCK 103 is not taught.)

INSTRUCTIONAL OBJECTIVES: Provide job qualification competencies required to perform drafting tasks in the activity areas of -

1. Performing basic tolerancing.
2. Making basic dimensions and notes.
3. Knowledge of primary shop processes.
4. Application of revolutions.
5. Application of intersections and developments.
6. Selection and use of measuring devices.

Job qualification performance standards will be applied.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a major component in the development of job qualification in the specialty area of Mechanical Drafting and Design Technician or the lower level job of Mechanical (Industrial) Drafter. It does provide additional skills to the qualification gained by completion of Drafting (Graphic Communications) Part I courses of this program.

PREREQUISITES: The Basic Drafting (Graphic Communications) Part I courses including: Introduction to Drafting, Basic Technical Drafting, Problem Solving, Reproduction, Composition (Layout), Freehand Sketching and Drawing and Lettering.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items to be task performance directed. Performance standards should be those required to meet initial employment job requirements for the task concerned.

EQUIPMENT: Drafting equipment normally required in a drafting room environment on the job. See also Appendix A, Part I - Basic.

Note 1: Where high school instructors have time allocations and the instructional qualifications to present the course and apply the required performance standards, it is considered appropriate to conduct such instruction at the high school level.

Note 2: The task listing and performance standards only are provided to guide instructors/teachers and serve as a reference to ensure that standard instructional content for common courses of occupational instruction and that job qualification performance standards are applied. This will permit lateral and vertical articulation action. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information that the worker requires for task performance.

Note 3: Skills and related technical information acquired in Part I of this program should be concurrently reviewed and applied where appropriate in the courses of instruction subsequent thereto.

TASK LIST: Tolerancing - Dimensions and Notes - Shop Processes - Revolutions - Intersections and Development

Module .10 - Dimensions and Notes (Basic):

102.11 - Know significance of dimensions and notes placed on a working drawing.

102.12 - Identify, define, know proper use and draw dimensioning symbols, lines and notations.

102.13 - Apply appropriate methods of dimensioning different parts of a drawing.

102.14 - Use the International System of Units (SI) metrics, methods of conversion and application for working drawings.

102.15 - Use the dimensioning practices described in ANSI Y14.5.

102.16 - Determine limit dimensions, tolerances, clearances, etc. by the proper use of ANSI B4.1 Limit Tables.

102.17 - Use Machinery's Handbook to get the correct dimensions and specifications on standard threads, fasteners, twist drills, etc.

BLOCK 102 (Cont.)

TASK LIST: Tolerancing - Dimensions and Notes - Shop Processes - Revolutions - Intersections and Development (Cont.)

Module .10 - Dimensions and Notes (Basic):(Cont.):

102.18 - Apply special dimensioning practices as required.

102.19 - Specify fit according to use of the piece.

102.111 - Determine the correct machining process to obtain desired fit.

102.112 - Determine and specify proper finish for part.

102.113 - Specify welds as required.

Module .20 - Tolerancing (Basic):

102.21 - Know importance of accurate tolerance calculations with relation to interchangeable parts.

102.22 - Use appropriate reference tables in calculating tolerances.

102.23 - Know and use correct terms peculiar to tolerances as required on technical drawings.

102.24 - Know correct methods and convert common tolerances to metric tolerances.

Module .30 - Shop Processes:

102.31 - Know the capabilities and limitations of common machine shop machines and the activities related thereto.

102.32 - Know purpose, use and draw flow charts.

102.33 - Know and draw at the proper time and place the terms, notes and symbols on working drawings to indicate desired machine operations to include:

a. Machining symbols.

BLOCK 102 (Cont.)

TASK LIST: Tolerancing - Dimensions and Notes - Shop Processes - Revolutions - Intersections and Development (Cont.)

Module .30 - Shop Processes (Cont.):

b. Machine shop terms and basic elementary operations.

c. Drilling and boring of holes-notes.

d. Other operations noted regarding holes.

e. Miscellaneous machine shop operations.

Module .40 - Apply Revolutions:

102.41 - Know purpose, principles, types and use of revolutions and significance in technical drafting.

102.42 - Draw standard representations.

102.43 - Accurately decipher the relationship of lines, planes, angles and points when part of a revolved axis.

102.44 - Know and use the conventional drafting practices for describing objects.

102.45 - Prepare basic graph solutions of engineer problems.

102.46 - Draw pipe diagrams.

Module .50 - Apply Intersections and Developments:

102.51 - Apply basic theory of developments.

102.52 - Identify and know definition of generatrix, surface elements, prism, cone, truncated cone, frustrum and transition piece.

102.53 - Draw different types of intersections.

102.54 - Know industrial use of developments.

102.55 - Know meaning of development as applied in mechanical/technical drawing.

BLOCK 102 (Cont.)

TASK LIST: Tolerancing - Dimensions and Notes - Shop Processes - Revolutions - Intersections and Development (Cont.)

Module .50 - Apply Intersections and Developments (Cont.):

102.56 - Know and define terms related to development and their applications in drafting.

102.57 - Draw and apply different types of developments used in technical drafting, ie:

a. Prisms and cylinders by parallel line development.

b. Pyramids and cones by radial line development.

c. Transition piece.

Module .60 - Basic Working Drawings:

102.61 - Know and apply orthographic theory.

102.62 - Know purpose of working drawings.

102.63 - Measure and dimension on basic features of working drawings.

102.64 - Know, identify and draw various types of working and special shop drawings.

102.66 - Know and draw machine components shown and noted on working drawings.

102.67 - Know miscellaneous conventions found on mechanical drawings.

Module .70 - Selection and Use of Measuring Instruments:

102.71 - Know types and identifications of measuring devices.

102.72 - Know uses of different types of measuring devices.

102.73 - Measure parts to verify conformance with specifications.

BLOCK 102 (Cont.)

MINIMUM PERFORMANCE STANDARDS:

Drawings conform to ANSI Manuals where appropriate.

Neatness and accuracy apply.

Executes drawings within time limits considered acceptable for initial employment.

Demonstrates knowledge of related technical information, application of theories and procedures, symbols and conventions, and terminology with at least 80% accuracy.

Identifies and uses proper measuring devices with at least 80% accuracy.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Technical Drafting III (Threads, Fasteners, Motion Transfer and Welding)

BLOCK/COURSE NUMBER: 103 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 103 and DFT 1190) (Department of Public Instruction (see Note 1))

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program 180 Hours -
99 Hours - 1 Year Program HS*

INSTRUCTIONAL OBJECTIVES: Provide job qualification level competencies required to perform drafting tasks in the activity areas of -

1. Drawing threads, fasteners and springs;
2. Welding representation; and
3. Motion transfer (cams, gears, pulleys and belts, sprockets and chains) design and drafting.

Job qualification task performance standards will be applied.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualification. It is a major development in job qualification in the specialty area of Mechanical Drafting and Design Technician or the lower level of Mechanical (Industrial) Drafter. It does provide additional skill to the qualification gained by the completion of Drafting (Graphic Communications), Part I courses of this program.

PREREQUISITES: BLOCK 102 or BLOCK 1192 and the Basic Drafting (Graphic Communications), Part I courses including: Introduction to Drafting, Basic Technical Drafting, Problem Solving, Reproduction, Composition (Layout), Sketching and Lettering. It is essential that the student have the necessary mathematics and physical science background prior to entry into this Block of instruction.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items to be task performance directed. Performance standards to be those required to meet initial employment job requirements for task concerned.

BLOCK 103 (Cont.)

TASK LIST: Technical Drafting III (Threads, Fasteners, Motion Transfer and Welding)

EQUIPMENT: Drafting equipment required for job environment. See also Appendix A, Part I - Basic.

*Note 1: If high school instructors have the time allocations and the ability to teach this Block to the necessary competency depth and occupational standards are applied, and if the student has the necessary background in mathematics and physical science, then only it is considered appropriate to conduct such instruction at the secondary level, since it is part of the content of T&I 7573(Y-2). (Suggest discussing problem with local area CC/TI Drafting Instructor, if articulated.)

Module .10 - Threads, Fasteners and Springs:

103.11 - Identify and know use of various common fasteners used in mechanical devices and locate specifics in appropriate reference catalogs.

103.12 - Select, specify and draw proper fastener(s) for project requirement.

103.13 - Identify, select and draw proper screw thread(s) for project requirements.

103.14 - Know screw thread development from beginning through standardizations.

103.15 - Identify, know meaning or use and draw the various terms and symbols pertaining to thread to include: thread form, series, class of fit, multiplicity, direction of turn and length.

103.16 - Draw threads as required to include:

a. Acme - using semi-conventional or detailed representation method.

b. Square - using semi-conventional or detailed representation.

c. Profiles of simplified and schematic threads.

d. Regular square bolts and nuts.

e. Hex-head bolts and nuts.

BLOCK 103 (Cont.)

TASK LIST: Threads, Fasteners, Springs, Welding Representation and Motion Transfer (Cont.)

Module .10 - Threads, Fasteners and Springs (Cont.):

103.17 - Use thread tables.

103.18 - Identify, know use of, specify and draw standard keys, keyways, rivets and springs.

Module .20 - Welding Representation:

103.21 - Make detail working drawings that include welds, welded joints, and other fabrication information.

103.22 - Have required information and draw fusion and pressure welds.

103.23 - Know how and where to find welding symbols, the standard location of the elements of the symbols and symbol meaning in drafting standards.

103.24 - Identify basic types of welded joints on drawings.

103.25 - Draw pressure (resistance) weld symbols.

103.26 - Identify fusion weld symbols.

103.27 - Use welding templates in drawings.

103.28 - Draw weldments to replace a casting and calculate the weight.

Module .30 - Motion Transfer:

103.31 - Know and identify parts of a cam.

103.32 - Calculate and draw cam displacement diagrams.

103.33 - Know types and purposes of standard cams.

103.34 - Draw cam profiles which produce uniform motion.

103.35 - Draw cam profiles which produce uniformly accelerated motion.

103.36 - Draw cam profiles which produce harmonic motion.

BLOCK 103 (Cont.)

TASK LIST: Threads, Fasteners, Springs, Welding Representation and Motion Transfer (Cont.)

Module .30 -- Motion Transfer (Cont.):

103.37 - Draw cams from calculated or given displacement diagrams.

103.38 - Know and apply formulas and terminology used in spur gear application.

103.39 - Know meaning of different terms peculiar to standard types of gears.

103.311 - Calculate and draw spur gear tooth profiles.

103.312 - Use data and formulas required to draw working drawings of standard types of gears.

103.313 - Draw spur gears using the simplified representations.

103.314 - Draw spur gears using the conventional method.

103.315 - Know and identify bevel gear terminology and components.

103.316 - Draw bevel gears.

103.317 - Know and identify worm gear terminology and components.

103.318 - Calculate and draw worms and worm gears.

103.319 - Draw standard types of gear trains.

103.321 - Know types, use, identify and draw standard pulleys and belts.

103.322 - Know types, use, identify and draw standard chain and sprocket drives.

MINIMUM PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information and terminology, applies theories and procedures, uses symbols and conventions with at least 80% accuracy.

Executes drawings within time limits considered acceptable for initial employment performance.

Neatness and accuracy of execution apply.

Drawings conform to standards that apply as contained in ANSI Manuals and other appropriate technical manuals and tables.

BLOCK 103 (Cont.)

TASK LIST: Threads, Fasteners, Springs, Welding Representation and Motion Transfer (Cont.)

Note 2: The task listing and performance standards only are provided to guide teachers/instructors to ensure standard instructional content for common courses and that job qualification performance standards are applied which will permit both lateral and vertical articulation action.

Note 3: Skills acquired in Part I and other previous drafting instruction should be concurrently reviewed and applied where appropriate.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Descriptive Geometry

BLOCK/COURSE NUMBER: 204 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 204 and DFT 1125) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program
55 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: This course is a study of graphic analysis of space problems involving points, lines, planes, connectors and the spatial relationships between them. Practical design problems will be stressed with analytical verification where applicable. Visualization will be emphasized on each problem. The Le Systeme International d'units (SI) Metric System of Units is recommended for use with assigned problems.

JOB QUALIFICATIONS GAINED: This course does not by itself provide a specific and identifiable job qualification. It is a component in the development of job qualification as a Mechanical Drafting and Design Technician or Mechanical Drafter.

PREREQUISITES: DFT 102 or DFT 1192 (or permission from the instructor)

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items to be task performance directed. Performance standards should parallel those required to meet initial employment job performance requirements in related areas of activity for the task concerned.

EQUIPMENT: Conventional drafting equipment. See also Appendix A, Part I - Basic.

Note 1: The task listing and performance standards only are provided to guide instructors to ensure standard instructional content for common courses of instruction and that job qualification standards are applied which will enhance articulation between institutions concerned. The individual instructor is expected to use this guide to ensure that the required tasks are taught, while performing the necessary task analysis to determine the skills and related technical information that apply to each task.

BLOCK 204 (Cont.)

TASK LIST: Descriptive Geometry

Module .10 - Know Descriptive Geometry Theory:

204.11 - Know theory and application of descriptive geometry.

204.12 - Draw systems and projections used in descriptive geometry.

204.13 - Visualize space problems.

Module .20 - Draw Projection of Views:

204.21 - Know rules of projection for different views of object.

204.22 - Know application, identify and draw the primary and auxiliary views.

Module .30 - Visualize and Draw Lines and Planes:

204.31 - Differentiate between different lines in different views.

204.32 - Draw lines in true length bearings, slope and grade.

204.33 - Represent planes in space.

204.34 - Know rules regarding drawing lines and planes in space in true length and shape.

Module .40 - Know and Demonstrate Descriptive Geometry Theorems:

204.41 - Know relationship and draw parallel lines in principal and auxiliary views.

204.42 - Determine and draw angles between perpendicular and non-perpendicular lines.

204.43 - Determine and draw the dihedral angle between intersecting planes.

BLOCK 204 (Cont.)

TASK LIST: Descriptive Geometry (Cont.)

Module .50 - Solve Connector Problems:

204.51 - Determine perpendicular of a point-to-line, point-to-plane, and connecting of skewed lines.

204.52 - Know application and draw the perpendicular lines in both two and three views.

Module .60 - Draw Lines and Planes:

204.61 - Determine and draw a line piercing a plane.

204.62 - Determine and draw intersecting point between intersecting planes.

MINIMUM PERFORMANCE STANDARDS:

Student produces neat, accurate drawings.

Student demonstrates ability to visualize space problems and prepares solutions with at least 77% accuracy.

Student performs required tasks within reasonable time limits.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-04[illegible] (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Design Drafting I (Prepare Preliminary Drawings)

BLOCK/COURSE NUMBER: 205 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 205 and DFT 1171) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 88 Hours - 2 Year Program
88 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform drafting tasks related to the activity or duty area of preparing preliminary drawings. Also included is application of problem solving procedures, model making, layout and design sketching skills acquired in Part I of this program. Use of handbooks, tables, ANSI and related manuals as references will be stressed. Problem solving application will be extended to include the preparation of written and oral engineer reports.

JOB QUALIFICATIONS GAINED: This course does not by itself provide a specific D.O.T. or industry identified job qualification. It is a major component in the development of job qualification in the specialty area of Mechanical Drafting and Design Technician or the lower level job of Mechanical (Industrial) Drafter. It does review and use most of the skills and techniques acquired in the basic portion of the Drafting (Graphic Communications) - Part I of this program.

PREREQUISITES: BLOCK 102, BLOCK 1192, BLOCK 103, BLOCK 1190, DFT 204/DFT 1125, and Part I - Basic.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance directed. Performance standards should parallel those required to meet initial employment job performance requirements in related areas of activity for the task concerned.

EQUIPMENT: Drafting room equipment and materials normally available and used in the standard mechanical drafting environment. See also Appendix A, Part I - Basic. Model making materials as needed. To provide an instructional vehicle, every effort should be made to organize the classroom and conduct instruction, class administration and supervision in a way that portrays an Engineer Office atmosphere. Such action will provide the opportunity for concurrent instruction in "Office Practice".

BLOCK 205 (Cont.)

TASK LIST: Prepare Preliminary Drawings

Module .10 - Apply Special Skills and Information to Preparation and Obtaining Approval for Preliminary Drawings:

205.11 - Apply skills and techniques acquired in Problem Solving, including model making. (See Block 2.0, Part I - Basic.)

205.12 - Prepare written and oral engineer reports on problem solution.

205.13 - Apply skills and related technical information acquired in Freehand Drawing and Sketching and in Composition (Layout). (Part I - Basic.)

205.14 - Use handbooks, tables, ANSI and related manuals as references in problem solving and preliminary drawing preparation.

Module .20 - Prepare Layout Drawings:

205.21 - Obtain configuration information available.

205.22 - Apply Composition techniques. (Acquired in Composition Block, Part I.)

205.23 - Determine missing configuration details on layout.

205.24 - Receive guidance from engineer.

205.25 - Determine limits on geometry of design to include manufacturing tolerances and show on production layout.

205.26 - Effect liaison with interfering groups to resolve problem.

205.27 - Complete production layout, change preliminary design as needed to accommodate interferences.

205.28 - Work with engineer to calculate change in stress caused by design change.

205.29 - Obtain approval from engineer for layout.

BLOCK 205 (Cont.)

TASK LIST: Prepare Preliminary Drawings (Cont.)

Module .30 - Prepare Preliminary Working Drawings:

205.31 - Apply principle of third angle orthographic projection as practiced in the United States and Canada.

205.32 - Apply recommendations of USA Standards Institute pertaining to Drafting Practices (Y14.1-Y14.17) and Graphical Symbols (Y32 Series).

205.33 - Use drafting templates, drafting machines, etc.

205.34 - Use decals and transfer sheets.

205.35 - Use appropriate catalogs, industrial standards, company standards and handbooks.

205.36 - Determine information relevant to design.

205.37 - Make selection of standard parts.

205.38 - Select standard parts which can be altered to meet design requirements at savings.

205.39 - Complete assembly and installation drawings.

Module .40 - Prepare Preliminary Detail Drawings:

205.41 - Obtain parts numbers for all detail parts.

205.42 - Complete and issue all detail parts drawings. (Indicate required instruments for test model on special prints where required.)

205.43 - Complete bill of materials and parts list required on assembly and installation drawings.

205.44 - Obtain approval of all drawings and make drawing release.

BLOCK 205 (Cont.)

TASK LIST: Prepare Preliminary Drawings (Cont.)

Module .50 - Prepare Material and Standard Parts List:

205.51 - Determine material needed from specifications and dimensions in all detail drawings used on each assembly.

205.52 - Determine standard parts needed from assembly drawings and special detail drawings which altered standard parts.

Module .60 - Check Drawings and Obtain Release Approval:

205.61 - Verify dimensions and references on drawings.

205.62 - Check for drafting omissions, errors and completeness.

205.63 - Check for proper format, headings and note completeness.

205.64 - Check for proper callouts and proper general notes.

205.65 - Check for compliance with company standards and general appearance.

205.66 - Obtain final approval signatures.

MINIMUM PERFORMANCE STANDARDS:

Drawings conform to ANSI Manuals where appropriate.

Neatness and accuracy apply.

Problem solving, freehand sketching and drawing, and Composition (Layout) techniques properly applied. Reports are clear, concise and to the point. Model is well executed and portrays object accurately.

Executes drawings within time limits considered acceptable for initial employment.

Demonstrates knowledge of related technical information, application of theories and procedures, symbols and conventions, and terminology with at least 80% accuracy.

Performs tasks required in this duty area in proper sequence and conducts the necessary coordination.

Uses appropriate reference technical manuals, tables and catalogs correctly.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Design Drafting II (Working/Production Drawings)

BLOCK/COURSE NUMBER: 206 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 206 and DFT 1193)
(Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 77 Hours - 2 Year Program
77 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: Provide job qualification level competencies required to perform drafting tasks in the duty area of preparing production or working drawings. Develop blueprint reading competencies and knowledge of patent drawing requirements. Ability to use special drawing media and inking techniques. Job qualification performance standards will be applied.

JOB QUALIFICATIONS: This course does not by itself provide specific D.O.T. identified job qualification. It provides the opportunity to apply all skills learned to produce professional work ready for reproduction. It is a major component in the development of job qualification in the specialty area of Mechanical (Industrial) Drafting and Design Technician or the lower level job of Mechanical (Industrial) Drafter. It does provide additional skills to the qualification gained by completion of Drafting (Graphic Communications), Part I courses of this program.

PREREQUISITES: BLOCKS 102, 103, 204 & 205 or BLOCKS 1192, 1190, 1125 and 1171 and the program basic component, Drafting (Graphic Communications) Part I which include: Introduction to Drafting, Basic Technical Drafting, Problem Solving, Reproduction, Composition (Layout), Sketching and Lettering.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items to be task performance directed. Performance standards should be those required to meet initial employment job requirements for the task concerned.

EQUIPMENT: Drafting equipment normally required in a job environment. See also Appendix A, Part I - Basic. Special drafting media and inking materials. To provide an instructional vehicle, every effort should be made to organize the classroom and conduct instruction, class administration and supervision in a way that portrays an Engineer Office atmosphere. Such action will provide the opportunity for concurrent instruction in "Office Practice".

Note 1: The task listing and performance standards only are provided to guide instructors/teachers to ensure standard instructional content for common courses of occupational instruction and that job qualification performance standards are applied which will permit both lateral and vertical articulation action. The individual instructor is expected to perform necessary task analyses to determine the exact skills and related technical information that the worker requires for task performance.

TASK LIST: Design Drafting II (Working/Production Drawings)

Module .10 - Apply Axonometric Drawing Procedures:

206.11 - Know difference and identify isometric projections and drawings.

206.12 - Know difference between isometric, dimetric and trimetric drawings and draw each.

206.13 - Know application and when to use templates such as isometric elipse, and dimetric, isometric and trimetric protractors.

206.14 - Locate center of isometric drawing on paper.

Module .20 - Apply Oblique Drawing Procedures:

206.21 - Know distinguishing characteristics of oblique drawings.

206.22 - Draw different objects and shapes in the oblique.

Module .30 - Apply Perspective Drawing Procedures Where Appropriate:

206.31 - Know characteristics of perspective drawings.

206.32 - Draw objects and various shapes in perspective.

Module .40 - Make Design and Working Drawings:

206.41 - Be able to compare the merits of scientific and empirical design.

206.42 - Prepare working drawings which include:

a. Necessary detail drawings that describe the mechanical parts completely through correct choice of views and dimensions. (Minimum detail drawings - five.)

DFT 206/DFT 1193 (Cont.)

TASK LIST: Working Drawings (Cont.)

Module .40 - Make Design and Working Drawings (Cont.):

b. Choose number of detail drawings per sheet and space to ensure clarity. (Apply composition skills and techniques acquired in Part I.)

c. Apply tolerancing procedures.

d. Apply dimensioning procedures.

e. Consider shop processes in specifications and shop notes.

f. Provide necessary drawing numbers, parts lists, title and record strips or blocks, zoning and revisions as apply to the drawing.

206.43 - Make assembly drawings by completing pictorial general assembly drawing of product previously drawn in detail.

206.44 - Prepare exploded view drawing where appropriate.

206.45 - Know and apply time saving ways to draw mechanical objects. (Minimum - five different ways.)

206.46 - Apply inking techniques where appropriate.

206.47 - Use various special drafting media as appropriate (vellums, plastic films, etc.).

Module .50 - Read Blueprints:

206.51 - Know purpose and uses of blueprints.

206.52 - Know how to read blueprints.

206.53 - Know blueprint care and storage requirements.

Module .60 - Prepare Patent Drawings:

206.61 - Know rules of patent drawing practice.

DFT 206/DFT 1193 (Cont.)

TASK LIST: Working Drawings (Cont.)

Module .60 - Prepare Patent Drawings (Cont.):

206.62 - Know standards of design representation and acceptable symbols.

206.63 - Use "Guide for Patent Draftsmen" by U.S. Government Printing Office.

MINIMUM PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information, application of theories and procedures, symbols and conventions, and terminology with at least 80% accuracy.

Executes drawings within time limits considered acceptable for initial employment performance.

Neatness and accuracy of execution apply.

Drawings conform to standards that apply as contained in ANSI Manuals and other appropriate technical publications. Applies prescribed inking techniques.

Uses correct template as prescribed when appropriate.

Reads blueprints with at least 80% accuracy.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Mechanisms

BLOCK/COURSE NUMBER: 211 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 211) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program(*)
55 Hours - 1 Year Program (*)

INSTRUCTIONAL OBJECTIVES: To provide job qualification competency enhancement in the ability to perform drafting tasks related to the graphical analysis and solution of kinematic principles in the design of mechanisms and machine elements. The specific objectives are --

1. To provide the student with knowledge of the basic terminology and concepts of mechanisms.
2. To provide the student with the ability to perform both drafting room and mathematical solutions to problems involving the principles of machine elements.
3. To provide the student with knowledge of the methods used to design gears, gear trains, cams, pulleys and belting.

JOB QUALIFICATIONS: This course does not by itself provide specific D.O.T. identified job qualification. It is an augmentation to the development of job qualification in the specialty area of Mechanical Drafting and Design Technician or the lower level job classification of Mechanical (Industrial) Drafter. It should be considered as an elective.

PREREQUISITES: BLOCK 103, BLOCK 1190, BLOCK 205 (Preliminary Drawings), MAT 103 (Technical Math III), MEC 104 or equivalent.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance directed. Performance standards should be those required to meet initial employment job requirements for the task concerned.

EQUIPMENT: Drafting equipment normally required in a drafting room environment, plus a blackboard. See also Appendix A, Part I - Basic.

(*) This course is to be considered as an elective for the 1 and 2 Year Programs. It is a priority elective for the 2 Year Program.

DFT 211 (Cont.)

Note 1: The task listing and performance standards only are provided as a reference to guide the instructors to ensure that the instructional content for common courses is essentially the same and that job qualification standards are applied. This procedure will result in vertical and lateral instructional content articulation. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information that must be taught if the learner is to become job qualified in the task concerned.

TASK LIST: Mechanisms

Module .10 - Basic Concepts Related to Mechanism Design:

211.11 - Know terminologies used with mechanisms.

211.12 - Know classes of motion in a plane.

Module .20 - Motions and Mechanisms That Cause Displacement:

211.21 - Know the fundamental motions.

211.22 - Know the mechanisms that produce or generate different displacements.

211.23 - Know mechanism design techniques to include those for (a) enlargement or reduction; (b) achieving specific displacements; (c) following fixed paths; (d) using the fixed template method; (e) using the method of combined cams; and (f) providing linkages for given paths.

Module .30 - Mechanisms and Velocity:

211.31 - Solve design problems involving linear velocity.

211.32 - Solve design problems involving angular velocity.

211.33 - Know the rigid body concept.

211.34 - Locate the instant center of rotation.

211.35 - Know the relative-body concept; a tool of analysis.

211.36 - Use the velocity vector diagram in problem solving.

211.37 - Solve design problems involving pure rolling contact.

211.38 - Calculate velocities in sliding contact.

211.39 - Know differences caused by rolling and sliding velocities.

DFT 211 (Cont.)

TASK LIST: Mechanisms (Cont.)

Module .40 - Acceleration Design Factors:

211.41 - Solve problems of linear acceleration to include (a) uniform acceleration; (b) variable acceleration; (c) along curved paths; (d) on bodies rotating at constant speed; (e) on bodies rotating with variable angular velocity; and (f) determining directions of linear acceleration.

211.42 - Know types of angular acceleration.

211.43 - Calculate accelerations on bodies in translation.

211.44 - Calculate accelerations on bodies in rolling contact.

211.45 - Calculate accelerations on a rigid body.

211.46 - Calculate accelerations on bodies in combined motion.

211.47 - Prepare graphic solutions that (a) determine effective components of acceleration; (b) determine accelerations by the vector-polygon method; (c) apply construction of an acceleration polygon; and (d) use the vector image.

211.48 - Select methods for acceleration study.

211.49 - Know the Velocity-Difference Method for determining acceleration.

211.411 - Determine effect of Coriolis Force on acceleration.

TASK

211.50 - Perform graphic analysis of motion by application of graphical calculus.

Module .60 - Solve Problems of Motion Transmission:

211.61 - Know cam terminologies and solve design problems.

211.62 - Know terminologies and solve problems related to gears and gear trains.

DFT 211 (Cont.)

TASK LIST: Mechanisms (Cont.)

MINIMUM PERFORMANCE STANDARDS:

Student makes necessary calculations with 77% or better accuracy.

Drawings are neat, accurate, and show comprehension of graphic solutions to mechanism problems.

Student is able to demonstrate ability to design simple cams and gears to achieve the motion or gear ratio specified.

Performs tasks in time limits considered acceptable for job qualification.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE: Jigs and Fixtures Design

BLOCK/COURSE NUMBER: 212 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 212 and DFT 1191) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program
55 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies in drafting pertaining to -

1. Knowledge of the principles involved in the design and production of common types of jigs and fixtures;
2. Application and use of jigs and fixtures;
3. Knowledge of standard parts for jigs and fixtures; and
4. Practical application of theories and procedures in the design and drawing of Drill Jigs and Milling Fixtures.

JOB QUALIFICATIONS: This course does not by itself provide specific D.O.T. identified job qualifications. It is a major component in the development of job qualification in the specialty area of Mechanical Drafting and Design Technician or the lower level job of Mechanical (Industrial) Drafter.

PREREQUISITES: BLOCKS 205 and 211 (Mechanisms) desirable.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance directed. Performance standards should be those required to meet initial employment job requirements for the task concerned.

EQUIPMENT: Drafting equipment normally required in a drafting room environment on the job. See also Appendix A, Part I - Basic.

Note 1: The task listings and performance standards only are provided as a reference to guide the instructors to help to ensure that the instructional content for common courses is essentially the same and that job qualification performance standards are applied. This procedure will result in vertical and lateral instructional content articulation. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information (competencies) that must be taught if the learner is to become job qualified in the task concerned.

DFT 212/DFT 1191 (Cont.)

TASK LIST: Jigs and Fixtures Design

Module .10 - Terminologies Related to Jigs and Fixtures:

212.11 - Know definition and purposes of jigs and fixtures.

212.12 - Know economic aspects of design.

212.13 - Know principles relating to design details.

212.14 - Know tool design standards.

212.15 - Know details of jig and fixture design.

212.16 - Know locating schemes for jigs and fixtures.

212.17 - Know use of vices, vice jaws, clamps and clamping devices.

212.18 - Know use of drill jig bushings.

Module .20 - Design Drill Jigs:

212.21 - Know types of drill jigs.

212.22 - Know major considerations in jig design.

212.23 - Know jig planning procedures.

212.24 - Know factors characteristic to jig design.

212.25 - Know and use special drafting applications for jig design.

212.26 - Design and draw jigs.

Module .30 - Design Fixtures:

212.31 - Know types and uses of fixtures.

212.32 - Know factors in fixtures design.

212.33 - Know purpose and use of grinding machine fixtures.

212.34 - Know tool room system for fixtures and fixture components.

212.35 - Design and draw fixtures.

DFT 212/DFT 1191 (Cont.)

TASK LIST: Jigs and Fixtures Design (Cont.)

MINIMUM BASIC PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information and terminology, applies theories and procedures, uses symbols and conventions with at least 80% accuracy.

Executes drawings within time limits considered acceptable for initial employment performance.

Neatness and accuracy of execution apply.

Drawings conform to standards that apply as contained in ANSI Manuals and other appropriate manuals and tables.

Applies most appropriate techniques of execution in drawings.

Note 2: To provide an instructional vehicle, every effort should be made to organize the classroom and conduct instruction, class administration and supervision in a way that portrays an Engineer Office atmosphere. Such action will provide the opportunity for concurrent instruction in "Office Practice".

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Mechanical Drafting and Design - T-043 (2 Year)
Mechanical (Industrial) Drafting - V-017 (1 Year)

BLOCK/COURSE TITLE:

Design Drafting III: (Part A)	Sub-Block (1)	Introduction to Punch and Die Drafting and Design
	Sub-Block (2)	Introduction to Electro-Mechanical Drafting and Design
	Sub-Block (3)	Introduction to Printed Circuit Drafting and Design
Design Drafting III: (Part B)	Sub-Block (1)	Application of Punch and Die Drafting and Design
	Sub-Block (2)	Application of Electro-Mechanical Drafting and Design
	Sub-Block (3)	Application of Printed Circuit Drafting and Design

BLOCK/COURSE NUMBER: 223 - Includes Instructional Content In Courses Identified As: (Community Colleges/Technical Institutes - DFT 223 and DFT 1191) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended):
223A - 55 Hours - 2 Year Program
223A - 55 Hours - 1 Year Program

223B - 44 Hours - 2 Year Program(*)
223B - 44 Hours - 2 Year Program(*)

INSTRUCTIONAL OBJECTIVES: 223A - To provide the student with required basic introductory information and knowledge regarding the design procedures for (a) punch and die design; (b) electro-mechanical design; and (c) printed circuit design.

223B - As a continuation of 223A, to provide instruction and opportunity for application of acquired skills and related technical information leading to the competencies required for job qualification in the duty areas of (a) punch and die design and drafting; (b) electro-mechanical design and drafting; and (c) printed circuit design and drafting.

(*) 223B is considered to be an elective that should be taught when there is a requirement for the skills in the local area. It is an extension of 223A, with the combination of the two providing job qualification.

DFT 223/DFT 1191 (Cont.)

TASK LIST: Block 223A(1) - Introduction to Punch and Die Drafting and Design (Cont.)

Module .20A - Know Punch and Die and Component Parts Terminology:

223.21A(1) - Know definitions of terms pertaining to punches and dies.

223.22A(1) - Know basic principles of punch and die operations.

223.23A(1) - Know economic aspects of punch and die design.

223.24A(1) - Know principles relating to details of punch and die design.

223.25A(1) - Know tool design standards.

Module .30A(1) - Know Punch and Die Design Procedures:

223.31A(1) - Know types of punches and dies.

223.32A(1) - Know factors, basic steps and components involved in the design of punches and dies.

223.33A(1) - Know considerations in the economy of design.

223.34A(1) - Know tool room system of punches and dies.

223.35A(1) - Know primary procedures for the design of a punch and die set from a piece part.

TASK LIST: Block 223A(2) - Introduction to Electro-Mechanical Drafting and Design

223.01A(2) - Know types of inking equipment, uses and the purpose of inking.

223.02A(2) - Know types and use of electrical drawings and diagrams to include (a) pictorial drawings; (b) connection diagrams (wiring diagrams); (c) elementary diagrams (schematic diagrams); (d) wiring harnesses: (e) cable harnesses; (f) printed circuits; and (g) block diagrams.

223.03A(2) - Know templates available for use in making electrical drawings and diagrams.

DFT 223/DFT 1191 (Cont.)

TASK LIST: Block 223A(3) - Introduction to Printed Circuit Drafting and Design

Module .10A(3) - Know How A P-C Board Is Made:

223.11A(3) - Know the P-C Board development process from sketching to printing.

223.12A(3) - Be able to describe the etching and plating process.

223.13A(3) - Be able to describe the P-C Board fabrication and assembling process.

Module .20A(3) - Know How to Read A Schematic Diagram for A P-C Board:

223.21A(3) - Know composition, layout and reference designations of schematic diagrams.

223.22A(3) - Know standards and symbols applied to schematic diagrams.

Module .30A(3) - Know the P-C Board Layout Process--The Sketch:

223.31A(3) - Know the general considerations, the grid and the board outline.

223.32A(3) - Know the purpose of component holes, their locations on the grid and the spacing.

223.33A(3) - Know component location and conductor layout.

Module .40A(3) - Know the Final Considerations for P-C Board Layout:

223.41A(3) - Know the hole sizing, lead terminations and interfacial connections.

223.42A(3) - Know the considerations for conductor width.

223.43A(3) - Know the considerations for conductor spacing.

MINIMUM PERFORMANCE STANDARDS:

Student demonstrates knowledge of related technical information, terminology, theories and procedures, identifies symbols and conventions with at least 80% accuracy.

Demonstrates knowledge of and the ability to use the appropriate technical manuals and standard manuals with at least 80% accuracy.

DFT 223/DFT 1191 (Cont.)

COURSE: Design Drafting III(B)(*)

INSTRUCTIONAL OBJECTIVE: To develop job qualification competencies in Punch and Die Design and Drafting, Electro-Mechanical Design and Drafting and Printed Circuit Design and Drafting. (This is a continuation of DFT 223A/DFT 1191 - Design Drafting III(A).)

TASK LIST: Block 223B(1) - Application of Punch and Die Drafting and Design

Module .10B(1) - Improve Knowledge of Punch and Die Design (Review):

223.11B(1) - Know the purpose of industrial punches and dies.

223.12B(1) - Know the utilization of punches and dies.

223.13B(1) - Know the elements of good punch and die design.

Module .20B(1) - Improve Knowledge of Punch and Die and Component Parts Terminologies (Review):

223.21B(1) - Know definitions of terms pertaining to punches and dies.

223.22B(1) - Know the basic principles of punch and die operations.

223.23B(1) - Know the economic aspects of punch and die design.

223.24B(1) - Know the principal details of punch and die design to include: blanking and/or piercing, shearing action of stock, cutting clearance, size relationship of piece part to punch and die block, angular clearance, die set and slug openings.

223.25B(1) - Know tool design standards.

223.26B(1) - Know and explain functions of details of punch and die design to include: die sets, punches (types), mounting screws and dowels, die blocks, pilots, strippers, die stops and nest gauges.

(*) Part B of DFT 223/DFT 1191 is to be considered as an elective - 44 Hours.

DFT 223/DFT 1191 (Cont.)

TASK LIST: Block 223B(1) - Application of Punch and Die Drafting and Design

Module 223.30B(1) - Design Punches and Dies:

223.31B(1) - Know types of punches and dies.

223.32B(1) - Know major factors in the design of punches and dies.

223.33B(1) - Plan the design of a punch and die.

223.34B(1) - Know and be able to apply the specialized drafting applications for punch and die design. (American Standard Drawing Procedures.)

223.35B(1) - Know the requirements for the practice of economy of design.

223.36B(1) - Know the tool room system of punches and dies.

223.37B(1) - Design punches and dies from piece parts.

TASK LIST: Block 223B(2) - Application of Electro-Mechanical Drafting and Design

223.01B(2) - Know the types, purpose and how to use inking equipment.

223.02B(2) - Know types, purposes and how to draw electrical drawings and diagrams to include (a) pictoral drawings; (b) connection designs; (c) elementary diagrams; (d) wiring harnesses;(e) cable harnesses;(f) printed circuits; and (g) block diagrams.

223.03B(2) - Use templates available for use in making electrical drawings and diagrams.

223.03B(2) - Design and draw an electro-mechanical item giving full consideration to design scheduling.

DFT 223/DFG 1191 (Cont.)

TASK LISTING: Block 223B(3) - Application of Printed Circuit Drafting and Design

223.01B(3) - Describe a Printed Circuit Board and know purpose and use.

223.02B(3) - Describe P-C Board development procedures.

223.03B(3) - Read a schematic for a P-C Board.

223.04B(3) - Apply the sketch phase in P-C Board layout.

223.05B(3) - Perform the final considerations in P-C Board layout. (Hole sizing, lead terminations, interfacial connections, conductor width and conductor spacing.)

Module .60B(3) - Draw Master Pattern for P-C Board:

223.61B(3) - Determine scale, size, accuracy and tolerances.

223.62B(3) - Use the correct materials for P-C Board drafting.

223.63B(3) - Use pre-cut tape shapes.

223.64B(3) - Determine terminal areas and minimum annular rings.

223.65B(3) - Make provisions for connectors, cross-hatching and board outlines.

223.66B(3) - Determine and locate supporting holes, indexing holes, register marks and board markings.

TASKS

223.07B(3) - Prepare the master drawing for the P-C Board to include preparation, dimensioning, hole identification and notes.

223.08B(3) - Design a P-C Board as directed.

MINIMUM BASIC PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information and terminology, applies theories and procedures, uses symbols and conventions with at least 80% accuracy.

DFT 223/DFT 1191 (Cont.)

MINIMUM BASIC PERFORMANCE STANDARDS (CONT.):

Demonstrates knowledge and ability to use correctly the appropriate technical manuals and standard manuals.

Executes drawings and sketches within the time limits considered acceptable for initial employment performance.

Neatness and accuracy of drawing and sketch execution apply.

Drawings conform to the applicable standards as contained in the ANSI Manuals and other appropriate manuals and tables.

Applies the most appropriate techniques and use the proper equipment and materials for drawing purpose in execution of drawings.

Note 2: To provide an instructional vehicle, every effort should be made to organize the classroom and conduct instruction, class administration and supervision in a way that portrays an Engineer Office atmosphere. Such action will provide the opportunity for concurrent instruction in "Office Practice".

A STATE ARTICULATED INSTRUCTIONAL OBJECTIVES GUIDE

(STATE PILOT MODEL)

FOR

DRAFTING (GRAPHIC COMMUNICATIONS)

PART II - SPECIALTY PROGRAMS

SECTION - B (ARCHITECTURAL DRAFTING PROGRAMS)

DEPARTMENT OF COMMUNITY COLLEGES

ARCHITECTURAL DRAFTING AND DESIGN	(T-041)
DRAFTING (BUILDING TRADES)	(V-015)

DEPARTMENT OF PUBLIC INSTRUCTION

ARCHITECTURAL DESIGN III (T&I 7563(Y-2))

JULY 1978

PREPARED BY

ARTICULATION OF OCCUPATIONAL EDUCATION PROGRAMS BETWEEN
SECONDARY SCHOOLS AND TECHNICAL INSTITUTES/
COMMUNITY COLLEGES PROJECT

A JOINT RESEARCH PROJECT SPONSORED BY
THE NORTH CAROLINA STATE DEPARTMENT OF PUBLIC INSTRUCTION
AND
THE NORTH CAROLINA STATE DEPARTMENT OF COMMUNITY COLLEGES

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ELECTIVES (DRAFTING):

Reinforced Concrete Construction C221.01

Architectural Presentations II (Delineations and Models; Presentations) 1242.01

Structural Drafting (Wood, Steel and Concrete) 230.01

ARTICULATION RESEARCH PROJECT
PROGRAM SUMMARY

DRAFTING (GRAPHIC COMMUNICATIONS)
PART II - SPECIALTY PROGRAMS
SECTION B - (ARCHITECTURAL DRAFTING PROGRAMS)

PROGRAM: Architectural Drafting and Design
Drafting (Building Trades)

PROGRAM NUMBER: Department of Community Colleges - T-041 and V-015
Department of Public Instruction - Not identified as a program. (Course T&I 7563(Y-2) is the high school drafting course with related drafting program content.)

DRAFTING COURSES OR BLOCKS OF INSTRUCTION:

ARCHITECTURAL MATERIALS AND METHODS OF CONSTRUCTION I - BLOCK 105
(Building Materials, Types, Identifications, Characteristics, Uses and Methods of Joining) (This block of instruction includes contents of courses identified as CIV 105, ARC 1264 and T&I 7563(Y-2).)*

ARCHITECTURAL MATERIALS AND METHODS OF CONSTRUCTION II - BLOCK C106
(Continuation - Building Materials, Types, Identifications, Characteristics, Uses and Methods of Joining) (This block of instruction includes contents of courses identified as CIV 106 and ARC 1265.)*

ARCHITECTURAL ENVIRONMENTAL SYSTEMS - BLOCK A106
(Electrical, Heating and Air Conditioning and Plumbing Systems; Applicable Building Codes; With Environmental Considerations) (This block of instruction includes contents of courses identified as AHR 106, DFT 221, ARC 1238 and ARC 1239.)*

ARCHITECTURAL DRAFTING AND DESIGN I - BLOCK 107
(Preparation of Residential Working Drawings; Upgrading Technical Drafting Skills) (This block of instruction includes contents of ARC 107, ARC 1228, ARC 1231 and part of T&I 7563 (Y-2).)*

ARCHITECTURAL DRAFTING AND DESIGN II - BLOCK 108
(Working Drawings - Commercial Construction) (This block of instruction includes contents of courses identified as ARC 108 and ARC 1231.)*

SITE SURVEY AND DEVELOPMENT - BLOCK 150
(Site Survey for Construction, Site Planning, Foundation Location, Site Plans Drawing) (This block of instruction includes contents of courses identified as DFT 150, CIV 101 and ARC 1250.)*

HISTORY OF GRAPHICS AND ART (ARCHITECTURAL) - BLOCK 181
(The History of Architecture As An Art Form) (This block of instruction includes courses identified as DFT 181 and ARC 1121.)*

ARCHITECTURAL DRAFTING AND DESIGN III - BLOCK 220
(Working Drawings - Commercial, Structural Systems and Materials) (This block of instruction is related to ARC 220, DFT 220 and ARC 1232.)*

ARCHITECTURAL DRAFTING AND DESIGN IV - BLOCK 221
(Working Drawings) (This block of instruction includes contents of courses identified as ARC 221 and ARC 1233.)*

CODES, SPECIFICATIONS AND CONTRACT DOCUMENTS - BLOCK 235
(Building Codes, Construction Specifications and Contract Documents) (This block of instruction includes contents of courses identified as DFT 235, ARC 1145 and part of T&I 7563(Y-2).)*

CONSTRUCTION ESTIMATING AND FIELD INSPECTIONS - BLOCK 236
(Techniques of Estimating Quantity and Costs of Material, Labor and Equipment for Construction and The Requirements for Supervision of Construction Contract Administration) (This block of instruction includes contents of courses identified as DFT 236 and ARC 1112.)*

ARCHITECTURAL PRESENTATIONS I - BLOCK 250
(Architectural Delineations and Models; Architectural Office Procedures) (This block of instruction includes contents of courses identified as DFT 250 and ARC 1241)*

ELECTIVES (DRAFTING):

REINFORCED CONCRETE CONSTRUCTION - BLOCK C221
(Materials, Types, Uses and Procedures for Concrete Construction (Reinforced))** (This block of instruction includes contents of courses identified as CIV 221.)*

ARCHITECTURAL PRESENTATIONS II - BLOCK 1242
(Working Drawings With Presentations, Delineations and Models) (This block of instruction includes contents of courses identified as ARC 1242.)*

STRUCTURAL DRAFTING - BLOCK 230
(Wood, Steel and Concrete)** (This block of instruction includes contents of courses identified as DFT 230.)*

PART II (SECTION B) - PROGRAM INSTRUCTIONAL CONTACT HOURS, DRAFTING COURSES ONLY:

DCC - 1 Year - 891 to 1,067

2 Year - 1,067 Minimum

DPI - HS - 360

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*Note 1: Course numbers shown are in most cases local CC/TI course numbers and are used to help identify the block of instruction.

**Note 2: Suggested elective for 1 Year Program if instructional time is available.

INSTRUCTIONAL OBJECTIVES SUMMARY, PART II - SPECIALTY PROGRAMS
SECTION B - (ARCHITECTURAL DRAFTING PROGRAMS)

Suggested Instructional Time By Course - Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
BLOCK 105 88 Hours - 2 Year 88 Hours - 1 Year 90 Hours - HS Note: (Where possible, this course should precede instruction in BLOCK 107 (Working Drawings), otherwise concurrent instruction is suggested.)	Architectural Materials and Methods of Construction I - To provide job qualification competencies required to perform Architectural Drafting tasks related to knowing (1) building material types, identifications, physical properties characteristics, standard sizes and shapes, finishes and commercial volume and quantity units; (2) applications or uses of various types of building materials in construction; (3) methods used to join or connect various types of building materials used in construction; (4) use of manufacturers' publications, Sweets Catalogs and other technical reference materials to obtain construction information; (5) identification, meaning and how to draw conventions and symbols used in construction drafting, with emphasis on materials; and (6) meaning and use of standard construction terminology.
BLOCK C106 88 Hours - 2 Year 88 Hours - 1 Year None - HS	Architectural Materials and Methods of Construction II - To provide and further reinforce job qualification competencies required to perform Architectural Drafting tasks related to knowing (1) building material types, identifications, physical properties characteristics, standard sizes and shapes, finishes and commercial volume and quantity units; (2) applications or uses of various types of building materials in construction; (3) methods used to join or connect various types of building materials used in construction; (4) use of manufacturers' publications, Sweets Catalogs and other technical reference materials to obtain construction information; (5) identification, meaning and how to draw conventions and symbols used in construction drafting; (6) meaning and use of standard construction terminology; (7) how to use the American Institute of Architects (AIA) File System for materials; and (8) how to compare different manufacturers building materials to apply the "or equal" clause found in the building specifications.

INSTRUCTIONAL OBJECTIVES SUMMARY, PART II - SECTION B (CONT.)

Suggested Instructional Time By Course - Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
BLOCK A106 99 Hours - 2 Year 99 Hours - 1 Year None - HS	Architectural Environmental Systems I & II - To provide job qualification competencies required to perform Architectural Drafting tasks related to (1) drawing electrical power and lighting, heating and air conditioning system, and plumbing system plans; (2) incorporating applicable codes into environmental system planning; (3) incorporating lighting, acoustical and fire safety into construction planning, with reference to environmental considerations; and (4) giving consideration to environmental protection regulations in planning and drawing environmental systems.
BLOCK 107 121 Hours - 2 Year 121 Hours - 1 Year 180 Hours - HS	Architectural Drafting and Design I - To provide Architectural Drafting job qualification competencies for tasks requiring the drafter to (1) know the purpose, order of drawing, correct sheet size, layout and points of emphasis for working drawings; upgrade technical drafting skills; (2) know and use correct symbols and conventions for construction materials and construction views shown in detail drawings; (3) draw complete set of new residential construction working drawings; and (4) draw residential rehabilitation drawings and plans for rehabilitation of existing old buildings.
BLOCK 108 99 Hours - 2 Year 99 Hours - 1 Year None - HS	Architectural Drafting and Design II - To provide job qualification competencies required to perform Architectural Drafting tasks related to the preparation and drawing of working drawings for simple commercial structures. Concurrent instruction will be conducted to upgrade lettering techniques, drafting skills, and the use of Sweets Catalogs, AIA Graphic Standards, manufacturers' publications and Time-Saver Standards in drawing preparation.
BLOCK 150 88 Hours - 2 Year 88 Hours - 1 Year None - HS	Site Survey and Development - To provide job qualification competencies required to perform Architectural Drafting tasks related to (1) performance of basic surveying tasks; (2) drawing contour maps; (3) looking up deeds for construction sites; (4) drawing property lines from legal descriptions; (5) preparing site design drawings; (6) locating foundations and pier heights for

INSTRUCTIONAL OBJECTIVES SUMMARY, PART II - SECTION B (CONT.)

Suggested Instructional Time By Course - Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
	Site Survey and Development (Cont.) - residential construction; (7) calculating cutting and filling requirements for a construction site from a contour map; (8) drawing a profile section; (9) knowing and defining surveying terms; and (10) knowing the duties and responsibilities of a surveyor to include those involving deeds.
BLOCK 220 99 Hours - 2 Year 99 Hours - 1 Year None - HS	Architectural Drafting and Design III - To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the preparation for and drawing of a complete set of working drawings for a commercial building. Develop professionalism in the neatness, consistency, placement and character in lettering techniques and drafting skills. To provide further information regarding materials and types of structural systems common to commercial construction.
BLOCK 221 99 Hours - 2 Year 99 Hours - 1 Year None - HS	Architectural Drafting and Design IV - To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the preparation of working drawings from a preliminary sketch of a building. To provide a learning experience in working as part of a drafting team in a simulated professional architect's office environment. To demonstrate improvement in drafting and lettering skills and techniques and knowledge of construction materials, by types, uses, characteristics and applications.
BLOCK 235 55 Hours - 2 Year 55 Hours - 1 Year 90 Hours - HS	Codes, Specifications and Contract Documents - To provide job qualification competencies required to perform Architectural Drafting tasks related to knowing (1) aspects of building codes; (2) effect of building codes in relation to construction specifications and drawings; (3) code definitions which apply to stairs, exits and fire ratings as defined in the State Building Code Manual; (4) relationship between different agencies involved in administration of building codes; (5) elements of building contracts; (6) types of architectural contracts and the legal responsibilities involved in such contracts; (7) how to prepare building construction specifications; and (8) contract-document analysis procedures for the purpose of fixing client-architect-contractor responsibilities and duties, for mutual protection.

INSTRUCTIONAL OBJECTIVES SUMMARY, PART II - SECTION B

Suggested Instructional Time By Course - Contact Hours - CC/TI &HS	Summary - Course Instructional Objectives
BLOCK 236 55 Hours - 2 Year 55 Hours - 1 Year None - HS	Construction Estimating and Field Inspections - To provide the student with job qualification competencies required to perform Architectural Drafting tasks involving the estimation of construction labor equipment and materials quantity surveys and costs from working drawings, plans and specifications to include knowledge of the (1) types of estimates and the subdivisions of estimating; (2) techniques of estimating; (3) techniques of preparing material and labor quantity surveys from plans and specifications for wood, structural steel, and concrete in structures, residential buildings and highways; (4) techniques of estimating the total costs of various jobs including labor, materials, equipment, overhead and profit; (5) bidding procedures and preparation of bids; (6) purpose of field inspection or construction contract administration and the division of responsibility; (7) requirements of the project or project representative; (8) tools and equipment needed to administer the construction contract; (9) content of the contract and construction documents required to administer the construction contract; (10) requirements and duties for opening, running, closing and post-completion of the project; (11) records, forms and reports which may be required by construction contract; and (12) techniques of observing, inspecting, checking, testing materials and construction.
BLOCK 181 55 Hours - 2 Year None - 1 Year None - HS	History of Architecture, Graphics and Art - To provide background information relative to the development of art and architecture and their interrelationships through history. To provide background information as to the periods of history as related to their primary architectural forms, their characteristics and influence on modern architecture. To provide the student with information pertaining to Twentieth Century Architectural evolution and key figures in its development. To provide the student with the basic considerations used in judging current architecture.

INSTRUCTIONAL OBJECTIVES SUMMARY, PART II - SECTION B

Suggested Instructional Time By Course - Contact Hours - CC/TI & HS	Summary - Course Instructional Objectives
BLOCK 250 121 Hours - 2 Year None - 1 Year None - HS	Architectural Presentations I (Architectural Delineations and Models - Architectural Office Practice) - To provide job qualification competencies required by the Architectural Drafting and Design Technician to perform assigned tasks or to meet requirements for (1) demonstrating architectural presentation competencies; (2) preparing a design concept presentation from a preliminary design concept sketch; (3) knowing the organization and functions of a typical professional architect's office and the legal responsibilities in architectural practice (concurrent with presentation preparation); and (4) preparing a personal employment interview portfolio.
BLOCK C221 55 Hours - 2 Year** 55 Hours - 1 Year* None - HS	Reinforced Concrete Construction - To provide special job qualification competencies useful in the performance of Architectural Drafting tasks pertaining to knowing the composition and properties of plain concrete; calculating the requirements for size and placement of reinforcing steel; and analyzing and designing reinforced concrete beams of various shapes.
BLOCK 1242 121 Hours - 2 Year** None - 1 Year None - HS	Architectural Presentations II - To provide an augmentation to the job qualification competencies required by the Architectural Drafting and Design Technician in the performance of tasks required in the preparation and presentation of architectural design presentations to a client.
BLOCK 230 99 Hours - 2 Year** 99 Hours - 1 Year* None - HS	Structural Drafting - To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the analysis and drawing of structural systems applications of steel, wood and concrete. This course may be considered to be an augmentation to CIV 105 and CIV 106, Architectural Materials and Methods of Construction and is therefore shown as an elective.

*Recommend elective - 1 Year Program, if time available.
**Recommend elective - 2 Year Program, if time available.

JOB QUALIFICATIONS COMPETENCIES GAINED BY THE COMPLETION OF PART I - BASIC AND PART II - SPECIALTIES, SECTION B (ARCHITECTURAL DRAFTING PROGRAMS)

Successful completion of Part I - Basic and Part II - Specialties, Section B (Architectural Drafting) results in the following initial employment job qualifications (one to two years of on-the-job experience is normally required for full qualification for the upper level drafting jobs)--

Program Title	1977 - D.O.T. Title and Number
T-041 - Architectural Drafting and Design	Drafter, Architectural - 001.261-010
	Drafter, Landscape - 001.261-014
	Drafter, Construction - 005.281-010
T-041 - Architectural Drafting and Design and V-015 - Drafting (Building Trades	Drafter, Commercial - 017.261-026
	Drafter, Detail - 017.261-030
	Drafter, Heating and Ventilation - 017.261-034
	Drafter, Assistant - 017.281-018
	Drafter, Plumbing - 017.281-038
	Drafter, Structural - 005.281-014

PREREQUISITES:

Enrollment in the drafting specialties of Part II - Specialties is contingent upon successful completion of instruction required in Part I - Basic. Prerequisites for each individual course is shown upon the course summary sheet.

PERFORMANCE EVALUATION:

Evaluation should be by performance (Competency Based) testing. Test items should be task performance directed, to determine that the learner is job qualified to perform the job tasks organic to the duty area of activity related to the course of instruction. Performance standards applied should be those required to meet initial employment job requirements for the task concerned and the applicable standards manuals.

EQUIPMENT:

Drafting equipment normally found in a drafting room environment in local area industries. See also Appendix A, Part I - Basic.

PART II

DEVELOPMENT OF ARTICULATED SPECIALTY DRAFTING PROGRAMS

SECTION B - ARCHITECTURAL DRAFTING AND DESIGN/DRAFTING (BUILDING TRADES)

The instructional content requirements for Drafting (Graphic Communications), Part I - Basic, was developed by the State Articulated Drafting Advisory and Program Committee. This committee as shown in Part I consists of drafting teachers/instructors and craft advisors. The articulated specialty drafting or advanced drafting programs (Architectural and Mechanical), shown in Part II, are based upon Part I - Basic, which provides the essential instructional content guidance for the development of competencies in basic technical drafting, problem solving, reproduction, composition (layout), freehand sketching and drawing, and lettering. It was advisor consensus that the individual desiring to enter the drafting field or related occupations should have a firm grasp of the competencies presented in Part I - Basic, prior to attempting to acquire competencies in a drafting (Graphic Communications) specialty.

The specialty area of drafting presented in Section A, Part II is Mechanical Drafting, whereas this section(B) is Architectural Drafting. Shown are the courses in Drafting which are considered necessary as the articulated drafting components for Architectural Drafting and Design (T-041) and Drafting (Building Trades) (V-015) Programs offered by certain CC/TI. Section B is aligned with and recognizes the advanced specialty course titled Architectural Design III (T&I 7563(Y-2)) that is offered in many of the high schools. The instructional content is organized into courses with titles and numbers used by the North Carolina CC/TI. The competencies which should be taught for the student to be considered job qualified in the particular drafting duty area covered by the course are shown as tasks.

Tasks are those detail job functions or assignments which the worker normally performs and collectively make up the job. They may be initially grouped under headings to which they are related called duty areas. Duty areas and their subordinate tasks are identified and developed by performing a job analysis of the job which results in a listing of the tasks or a task inventory. For instructional purposes, duty areas with a large number of tasks or a smaller number of very complex tasks, may be organized into courses. Duty areas with a limited number or relatively simple tasks are identified as "Sub-blocks" and are grouped with one or more other related blocks to form an instructional course. The duty areas and tasks listed in the Architectural Section were developed from a review of course outlines and information provided by Fayetteville Technical Institute, Forsyth Technical Institute, Pitt Technical Institute, The Sanford, North Carolina Project and The Peninsula Vocational Education Center, Hampton, Virginia.

All of the information obtained from the sources cited were synthesized to develop a series of courses compatible with general program guidance from the N.C. State Department of Community Colleges and current practice by the contributing institutions. The tasks which appeared to be taught by most of the institutions for the same course are listed as part of the instructional task inventory. Those tasks which appeared to be the most complex in nature with many sub-tasks were identified as "modules", with the components listed under such a heading. A general statement regarding the performance standards to be applied is shown at the bottom of each course task inventory. A notation is made on each inventory to the effect that the individual instructor will be expected to perform a task analysis of each task listed to determine the skills and related technical information that must be taught for the student to be job qualified to perform the task.

Instructional procedures are determined by the individual instructor. The important aspect and reason for this instructional objectives guide is to ensure that the instructors and teachers participating in an articulation agreement teach the same tasks as instructional content and apply the same performance standards. The task becomes the instructional objective. If the local area craft advisors identify a task or tasks not shown in the task inventory, then by general agreement of the advisors and the teachers/instructors concerned, such task(s) should be added to the articulated task inventory for the appropriate course. This may require adding more time to the course or reducing time allocated to tasks that see little use in the local area. To attain lateral articulation between institutions of the same educational level and to ensure that graduates are qualified for employment as drafters outside of their local area, instructors should teach all tasks in the inventory until such a time as the inventory is changed and tasks deleted or added by the committee that developed it. These task listings have been reviewed by instructors and also should be reviewed by local area advisors to ensure that they are accurate and reflect current and future industry requirements.

There are general similarities between the 2 Year Architectural Drafting Programs offered by various CC/TI. There are, however, considerable differences in the emphasis and the instructional contact hours time allocations provided for drafting and drafting related subject areas in these programs. For comparison purposes only, the maximum contact hours allocated by any one CC/TI appears to be 1,782 hours of drafting and related courses of a 2,200-hour program of instruction.

The courses in drafting and drafting related subjects contained in this program may exceed the contact hours of instruction allocated to such subjects by some CC/TI. In such an event, it is suggested that any review for the purpose of adjustments, include academic and supporting courses as well as drafting. It may be that all that is required is the allocation of more hours of instruction to the program. There is always the possibility that one or more academic or technical courses are not essential to job qualification. The primary consideration should be that the program objective is to develop highly qualified Architectural Drafters which would appear to give drafting and drafting related courses a priority.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Materials and Methods of Construction I

BLOCK/COURSE NUMBER: 105 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institute - CIV 105 and ARC 1264) (Department of Public Instruction - T&I 7563(Y-2))

INSTRUCTIONAL CONTACT HOURS (Recommended): 88 Hours - 2 Year Program
88 Hours - 1 Year Program
90 Hours - HS

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to knowing -

1. Building material types, identifications, physical properties characteristics, standard sizes and shapes, finishes and commercial volume and quantity units.
2. Applications or uses of various types of building materials in construction.
3. Methods used to join or connect various types of building materials used in construction.
4. Use of manufacturers' publications, Sweets Catalogs, and other technical reference materials to obtain construction information.
5. Identification, meaning and how to draw conventions and symbols used in construction drafting, with emphasis on materials.
6. Meaning and use of standard construction terminology.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification competencies required in the course subject area by the Architectural Drafting Technician and Building Trades Drafter.

PREREQUISITES: Instructional Equivalent to Basic Drafting, Part I.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

BLOCK 105 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction I (Cont.)

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic. This course will also require field trips to construction sites and building material sales and storage areas.

105.01 - Know construction terminology.

105.02 - Know how to find and use construction information in manufacturers' publications, Sweets Catalogs and other references.

105.03 - Know requirements and materials for footings and foundations.

105.04 - Know the primary considerations in concrete slab construction.

105.05 - Know the types, materials and requirements for conventional wood frame construction.

105.06 - Know the various requirements, types, materials, etc. for framing and finishing openings.

105.07 - Know considerations, materials, finishes and requirements for various types of exterior wall construction.

105.08 - Know types, materials and finishes for interior walls.

105.09 - Know requirements for fireplace construction.

105.10 - Know roof types, materials and other consideration for construction.

105.11 - Know types, location and essential considerations required for installation of insulation, vapor barriers and ventilation.

105.12 - Know types, requirements and materials for stair construction.

105.13 - Know equipment, materials, layout and location requirements for kitchen and bath construction.

BLOCK 105 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction I (Cont.)

105.14 - Know types of metals and uses in construction.

105.15 - Know methods used to connect or join materials used in construction.

105.16 - Identify, know proper use and how to draw symbols and conventions used in construction, with emphasis on materials.

MINIMUM PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information, how to use manufacturers' publications, Sweets Catalogs, and other reference materials, plus the content of such material with at least 80% accuracy.

Identifies, states proper use and draws required symbols and conventions with 80% accuracy.

Note 1: The task listing and performance standards only are provided to guide teachers/instructors and serve as a reference to ensure that standard instructional content for common courses of occupational instruction and that job qualification performance standards are applied. This will permit lateral and vertical articulation action. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information that the worker requires for task performance.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Materials and Methods of Construction II

BLOCK/COURSE NUMBER: C106 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - CIV 106 and ARC 1265) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 88 Hours - 2 Year Program
88 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to knowing -

1. Building material types, identification, physical properties characteristics, standard sizes and shapes, finishes and commercial volume and quantity units.
2. Applications or uses of various types of building materials in construction.
3. Methods used to join or connect various types of building materials used in construction.
4. Use of manufacturers' publications, Sweets Catalogs, and other technical reference materials to obtain construction information.
5. Identification, meaning and how to draw conventions and symbols used in construction drafting.
6. Meaning and use of standard construction terminology.
7. How to use the American Institute of Architects (AIA) file system for materials.
8. How to compare different manufacturers building materials to apply the "or equal" clause found in the building specifications.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualification. Successful completion of Blocks 105 and 106 and prerequisites can qualify a student as a Building Materials Manufacturer or Supplier Representative/Drafter. It, together with Block 105, constitutes a major element in the job qualification development for the specialty area of the Architectural Drafting Technician and the Building Trades Drafter.

BLOCK C106 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction II (Cont.)

PREREQUISITES: Basic Drafting, Part I and Block 105.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic. This course will also require field trips to construction sites and building material sales and storage areas.

Module .10 - Know Site Preparation Requirements:

C106.11 - Know site clearing actions.

C106.12 - Know grading and excavation considerations to include environmental.

C106.13 - Know drainage considerations and procedures.

C106.14 - Know need for and considerations for landscaping.

C106.15 - Know access roads (driveways), parking areas, walkways and other paving considerations.

C106.16 - Know types, uses and procedures for foundation construction.

Module .20 - Know Types, Uses, Materials and Procedures Employed With Concrete:

C106.21 - Know types, materials and procedures employed in form work.

C106.22 - Know types, materials and procedures employed in concrete reinforcement.

C106.23 - Know requirements for cast-in-place concrete.

C106.24 - Know types, characteristics and applications of precast concrete.

C106.25 - Know types, characteristics and applications of cementitious decks.

BLOCK C106 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction II (Cont.)

Module .20 - Know Types, Uses, Materials and Procedures Employed With Concrete (Cont.):

C106.26 - Know considerations in the application of proportioning mixes.

C106.27 - Know types, materials and procedures employed in reinforcement placement.

C106.28 - Know types, applications and procedures in concrete finishing.

C106.29 - Know precast concrete manufacturing methods for various types of use.

Module .30 - Know Types, Uses, Characteristics, Materials and Procedures Employed In Masonry Construction:

C106.31 - For mortars.

C106.32 - For unit masonry.

C106.33 - For building stone.

C106.34 - Know masonry construction procedures and methods.

Module .40 - Know Types, Characteristics, Applications and Standard Construction Procedures for Structural Metals, Including -

C106.41 - Structural steel.

C106.42 - Open-web joists.

C106.43 - Metal decking.

C106.44 - Light gauge framing.

C106.45 - Miscellaneous applications including stairs, gratings, castings and expansion joint covers.

C106.46 - Ornamental (wrought, cast and die-cast).

BLOCK C106 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction II (Cont.)

Module .50 - Know the Characteristics, Applications, Types and Construction Procedures for Wood Products In Construction:

C106.51 - Commercial sizes, shapes and finishes.

C106.52 - Structural woods (trusses, glue laminated and decking).

C106.53 - Conventional construction uses (rough carpentry, finish carpentry and custom woodwork).

TASKS

C106.61 - Know types, characteristics, applications and construction procedures for roof coverings.

C106.62 - Know types, characteristics, applications, materials and construction procedures in roof construction.

C106.63 - Know types, characteristics, applications and procedures using exterior finish materials.

C106.64 - Know types, characteristics, applications and procedures in the use of moisture protection materials.

C106.65 - Know types, characteristics, applications and procedures for installation and use in construction of doors, windows and glass.

C106.66 - Know types, characteristics, applications and installation procedures for finished hardware.

C106.67 - Know the types, characteristics, uses and methods of application of interior and exterior finishes, common to construction.

C106.68 - Know types, characteristics and applications of specialty materials often used in construction to include rubber, porcelain enameled products, glass blocks, sealers and caulking materials, adhesives and plastics.

BLOCK C106 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction II (Cont.)

TASKS (CONT.)

C106.69 - Compare different manufacturers' materials to apply the "or equal" clause found in building material specifications.

C106.70 - Have knowledge of the various types of manufacturers' literature and the information contained therein, plus the AIA file system for materials.

C106.71 - Know the common types of specialty equipment most frequently to be found in newly constructed buildings and their uses. (Sanitary equipment, heating and air conditioning, water fountains, etc.)

C106.72 - Know types of furnishings that may be included in architectural planning for finished construction ready for occupancy (carpeting, etc.).

MINIMUM PERFORMANCE STANDARDS:

Student can identify, state types, characteristics, standard sizes and shapes, common finishes and commercial volume and quantity units of building materials with 80% accuracy.

Student can state standard applications of various types of common building materials with 80% accuracy.

Student can state conventional methods used to join or connect common types of building materials.

Student can obtain desired information from technical reference publications with 80% accuracy.

Student can identify, state meaning and draw conventions and symbols used in construction drafting neatly, with 80% accuracy.

Student can state meaning and use of standard construction terminology with 80% accuracy.

BLOCK C106 (Cont.)

TASK LIST: Architectural Materials and Methods of Construction II (Cont.)

MINIMUM PERFORMANCE STANDARDS (CONT.):

Student demonstrates ability to use AIA File System for materials with 80% accuracy and within accepted time limits.

Student can demonstrate accurately the procedures for comparing different manufacturers' building materials to apply the "or equal" clause to be found in building specifications.

Note 1: The task listing and performance standards only are provided to guide teachers/instructors and serve as a reference to ensure that standard instructional content for common courses of occupational instruction and that job qualification performance standards are applied. This will permit lateral and vertical articulation action. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information that the worker requires for task performance.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Environmental Systems

BLOCK/COURSE NUMBER: A106 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - AHR 106, DFT 221, ARC 1238, ARC 1239) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program
99 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to -

1. Drawing electrical power and lighting system plans;
2. Drawing heating and air conditioning system plans;
3. Drawing plumbing system plans;
4. Incorporating applicable codes into environmental system planning;
5. Incorporating lighting, acoustical and fire safety into construction planning, with reference to environmental considerations; and
6. Giving consideration to environmental protection regulations in planning and drawing environmental systems.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. Successful completion of this course and the prerequisites of like instruction can qualify a student for employment as a Heating and Air Conditioning Drafter, Mechanical Systems Drafter, Electrical Systems Drafter or Plumbing Systems Drafter. It is a component in the development of job qualification as an Architectural Drafting Technician or a Building Trades Drafter.

PREREQUISITES: Basic Drafting, Part I.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

BLOCK A106 (Cont.)

TASK LIST: Architectural Environmental Systems

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic. The appropriate handbooks, codes, AIA Manuals, which contain the information regarding the equipment cited above should be available.

Module .10 - Draw Electrical Power and Lighting Systems:

A106.11 - Know types and uses of transformers.

A106.12 - Know types of service-entrance switch and metering equipment and use.

A106.13 - Know types of switch boards and use.

A106.14 - Know types and use of panel boards.

A106.15 - Know classifications and use of switches, circuit breakers and fuses.

A106.16 - Know types and use of electrical receptacles.

A106.17 - Know general groups and classifications of electric motors.

A106.18 - Know basic terminology, design consideration and distribution systems for electrical lighting, plus standard drawing symbols.

A106.19 - Know purpose and types of lighting protection.

A106.111 - Know electric requirements as contained in the National Electric Code.

A106.112 - Read blueprints for electrical installation.

A106.113 - Draw electrical installation layouts.

Module .20 - Draw Heating Systems:

A106.21 - Know general procedures for computing heating plant size.

A106.22 - Know types of heating systems and heating principles.

A106.23 - Know purpose and procedures for connecting vents to chimneys.

A106.24 - Know combustion air requirements and air pollution limits.

A106.25 - Know building code requirements for heating system installation.

A106.26 - Read blueprints for heating plant installation.

BLOCK A106 (Cont.)

TASK LIST: Architectural Environmental Systems I

Module .20 - Draw Heating Systems (Cont.):

A106.27 - Draw layout for heating plant installation.

A106.28 - Calculate heat loss for heating system and environmental comfort levels.

Module .30 - Draw Air Conditioning Systems (Heating and Air Conditioning Plants May Have the Same Distribution System):

A106.31 - Know general procedures for determining size of cooling plant to include calculating heat gain and environmental comfort levels.

A106.32 - Know types of air conditioning systems.

A106.33 - Know types of air conditioning control systems.

A106.34 - Know types of air conditioning ventilation systems.

A106.35 - Know basic code requirements and sources of information pertaining to air conditioning systems.

A106.36 - Read blueprints for air conditioning systems.

A106.37 - Draw layout of air conditioning system.

Module .40 - Draw Plumbing Systems:

A106.41 - Know types of water supply systems.

A106.42 - Know types of demands for water use.

A106.43 - Know minimum plumbing requirements for major facilities based on national plumbing code, plus water pollution limits.

A106.44 - Know pipe sizing requirements for major categories of plumbing use.

A106.45 - Know basic building code requirements and source of information.

BLOCK A106 (Cont.)

TASK LIST: Architectural Environmental Systems I

Module .40 - Draw Plumbing Systems (Cont.):

A106.46 - Know standard plumbing drafting symbols.

A106.47 - Read blueprints for plumbing installation.

A106.48 - Draw plumbing installation.

TASKS

A106.51 - Know basic principles for determining adequate illumination requirements for different areas, while practicing economy.

A106.52 - Know basic principles and materials to attain acoustical controls for noise pollution.

A106.53 - Know the applicable codes and other considerations that must be observed in the practice of fire protection and safety.

A106.54 - Make necessary adjustments in environmental systems to accommodate the handicapped where such laws apply or if construction is for private use, such adjustments have been requested.

MINIMUM PERFORMANCE STANDARDS:

Student can state related technical information (equipment types and use, principles for determining heat/cooling and light requirements, applicable codes, etc.) with 80% accuracy.

Student knows, can identify, use correctly and draw standard conventions and symbols for environmental, plumbing and electrical systems.

Student draws environmental, electrical and plumbing systems according to AIA and other industry standards.

Neatness and accuracy apply where appropriate.

Drawings are prepared within job qualification time limits.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Drafting and Design I (Working Drawings)

BLOCK/COURSE NUMBER: 107 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - ARC 107, ARC 1231, ARC 1228) (Department of Public Instruction - Part of T&I 7563 (Y-2))

INSTRUCTIONAL CONTACT HOURS (Recommended):
121 Hours - 2 Year Program
121 Hours - 1 Year Program
180 Hours - High School

INSTRUCTIONAL OBJECTIVES: To provide Architectural Drafting job qualification competencies for tasks requiring the drafter to:

1. Know the purpose, order of drawing, correct sheet size, layout and points of emphasis for working drawings. Upgrade technical drafting skills.
2. Know and use correct symbols and conventions for construction materials and construction views shown in detail drawings.
3. Draw complete set of new residential construction working drawings.
4. Draw residential rehabilitation drawings and plans for rehabilitation of existing old buildings.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification as an Architectural Drafting and Design Technician or a Building Trades Drafter.

PREREQUISITES: Instruction equivalent to CC/TI courses - BLOCK A106, BLOCK 105 and Drafting, Part I - Basic.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic. Material or facility with which to obtain necessary information for residential rehabilitation project.

BLOCK 107 (Cont.)

TASK LIST: Architectural Drafting and Design I (Working Drawings) (Cont.)

Note 1: The task listing and performance standards only are provided to guide instructors/teachers and serve as a reference to ensure that standard instructional content for common courses is presented and that job qualification standards are applied. This will permit lateral and vertical articulation action. The individual instructor/teacher is expected to perform the necessary task analyses to determine the exact skills and related technical information that the worker must have for task performance qualification.

Note 2: Where high school teachers have time allocations and the instructional qualifications to present the course and apply the required performance standards, it is considered appropriate to conduct instruction at the high school level in this course.

Module .10 - Upgrade Technical Drawing Skills:

107.11 - Draw objects using orthographic drawing techniques.

107.12 - Draw objects using the axonometric system techniques.

107.13 - Draw objects using perspective drawing techniques.

TASKS

107.02 - Know the purpose and order of drawing working drawings.

107.03 - Select the correct sheet size for working drawings.

107.04 - Layout working drawings.

107.05 - Know points of emphasis of working drawings.

107.06 - Know and use correct symbols and conventions for construction materials and construction views shown in detail drawings, by referring to Sweets Catalogs, AIA Manuals, and other technical references for information.

BLOCK 107 (Cont.)

TASK LIST: Architectural Drafting and Design I (Working Drawings) (Cont.)

Module .70 - Draw New Residential Construction Working Drawings:

107.71 - Make deed and title search for construction site.

107.72 - Check building codes, zoning, subdivision requirements and other legal restrictions relevant to construction site for both single and multi-family residences.

107.73 - Make site analysis.

107.74 - Draw preliminary site design.

107.75 - Refine the program.

107.76 - Sketch building design according to program.

107.77 - Present preliminary design for review.

107.78 - Prepare modifications of preliminary design.

107.79 - Draw floor plans.

107.711 - Draw elevations and sections.

107.712 - Present final plans for review.

107.713 - Draw modifications of final designs.

107.714 - Prepare final working drawings for (a) floor plans; (b) elevations; (c) sections; (d) details; (e) mechanical plan; (f) electrical plan: (g) plumbing plan; (h) details; (i) foundation plan; (j) schedules and miscellaneous details; and (k) site plan and title sheet.

BLOCK 107 (Cont.)

TASK LIST: Architectural Drafting and Design I (Working Drawings) (Cont.)

Module .80 - Draw Residential Rehabilitation Plans:

107.81 - Take measurements and field notes for rehabilitation drawings.

107.82 - Prepare measured plans, elevations and perspective drawings of existing conditions.

107.83 - Prepare rehabilitation plans and elevations sketch.

107.84 - Obtain sketch approvals.

107.85 - Prepare final rehabilitation plans, elevations, sections, perspectives, and schedules, plus mechanical plan if required.

107.86 - Prepare rough rehabilitation cost estimates.

MINIMUM PERFORMANCE STANDARDS:

Student demonstrates ability to use correctly the orthographic, axonometric and perspective drawing techniques.

Student demonstrates ability to locate and identify symbols and conventions in reference material and draw them with at least 80% accuracy.

Student can state purpose and order of working drawings.

Student demonstrates ability to identify and draw the various views common to working drawings.

Student demonstrates ability to perform the preparatory actions required prior to making the preliminary site design.

Neatness and accuracy apply.

Student performs required tasks within time limits considered to be acceptable for initial employment job qualification.

Lettering and drafting skills demonstrated show neatness, accuracy, consistency, proper placement and character.

Note 3: AIA suggests instruction in design and drafting of residential construction as the initial course of working drawings, with the balance of working drawing instruction to concentrate on commercial construction.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Drafting and Design II (Working Drawings - Commercial)

BLOCK/COURSE NUMBER: 108 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - ARC 108 and ARC 1231) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program
99 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to the preparation and drawing of working drawings for simple commercial structures. Concurrent instruction will be conducted to upgrade lettering techniques, drafting skills and the use of Sweets Catalogs, AIA Graphic Standards, manufacturers' publications and Time-Saver Standards in drawing preparation.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification as an Architectural Drafting Technician or a Building Trades Drafter.

PREREQUISITES: Instruction Equivalent to BLOCK 150, BLOCK 105, BLOCK C106, BLOCK 107 and BLOCK 235.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference materials normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic, this program.

BLOCK 108 (Cont.)

TASK LIST: Architectural Drafting and Design II (Working Drawings - Commercial) (Cont.)

TASKS

108.01 - Upgrade lettering techniques. (Neatness, consistency, placement and character.)

108.02 - Upgrade drafting skills. (Neatness, consistency and placement.)

Module .30 - Prepare Working Drawings From a Given Preliminary Drawing for a Simple Commercial Building. Working Drawings Should Require Drafter to:

108.31 - Draw a site plan for a commercial building.

108.32 - Draw a working drawing floor plan for a commercial building.

108.33 - Draw wall sections working drawings for a commercial building.

108.34 - Draw elevations working drawings for a commercial building.

108.35 - Draw details working drawings for a commercial building.

108.36 - Prepare mechanical, electrical and plumbing plans for building.

108.37 - Prepare schedules for a working drawing of a commercial building.

108.38 - Prepare a materials requirement to support proposed building.

108.39 - Prepare site plan and title sheet for proposed commercial building.

TASK

108.11 - Use Sweets Catalogs, AIA Graphic Standards, manufacturers' publications and Time-Saver Standards in drawing preparation.

BLOCK 108 (Cont.)

TASK LIST: Architectural Drafting and Design II (Working Drawings - Commercial) (Cont.)

MINIMUM PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information, how to use Sweets Catalogs, AIA and other technical reference material with 80% accuracy.

Produces neat, accurate and complete working drawings, professional in appearance and layout.

Draws symbols and conventions appropriate for the construction accurately and uses them correctly.

Performs tasks by producing required drawings within time limits considered to be appropriate for initial employment job qualification.

Lettering and drafting skills demonstrated show neatness, accuracy, consistency, placement and character.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Site Survey and Development

BLOCK/COURSE NUMBER: 150 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 150, CIV 101, ARC 1250) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 88 Hours - 2 Year Program
88 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to -

1. Performance of basic surveying tasks;
2. Drawing contour maps;
3. Looking up deeds for construction sites;
4. Drawing property lines from legal descriptions;
5. Preparing site design drawings;
6. Locating foundations and pier heights for residential construction;
7. Calculating cutting and filling requirements for a construction site from a contour map;
8. Drawing a profile section;
9. Knowing and defining surveying terms; and
10. Knowing the duties and responsibilities of a surveyor to include those involving deeds.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. Successful completion of this block and prerequisites can qualify a student for employment as a Civil Engineering Apprentice Drafter, Survey Recorder, etc. It is a component in the development of job qualification as an Architectural Drafting Technician or a Building Trades Drafter.

PREREQUISITES: Drafting, Part I - Basic or equivalent.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic. In addition, there will be a requirement for standard surveying equipment (transit, stadia rod, tapes, etc.).

BLOCK 150 (Cont.)

TASK LIST: Site Survey and Development (Cont.)

Module .10 - Perform Basic Surveying Requirements:

150.11 - Search and verify site deeds; know and define survey terms.

150.12 - Use surveying equipment to measure distances and angles.

150.13 - Perform a land survey of the construction site; learn surveyor duties.

150.14 - Draw property lines from legal descriptions.

150.15 - Prepare a contour map of the construction site.

150.16 - Locate foundations and pier heights on site.

150.17 - Calculate cut and fill requirements and draw profile of site.

150.18 - Perform user maintenance and care of surveying equipment.

150.19 - Prepare a site layout.

Module .20 - Perform Construction Site Considerations:

150.21 - Conduct a site evaluation.

150.22 - Determine climatological effects and site drainage requirements.

150.23 - Determine zoning impact upon proposed construction.

150.24 - Make allowance for traffic flow and vehicle access to site.

150.25 - Prepare plans to compensate for problems that surface during site evaluation and other subsequent actions that are site related.

MINIMUM PERFORMANCE STANDARDS:

Performs surveying tasks within accepted error limits.

Maintains equipment properly.

Executes drawings neatly and accurately in a professional manner.

Performs deed and title searches as prescribed.

Calculations accuracy at least 80%.

Demonstrates knowledge of terms, definitions and symbols with 80% accuracy.

BLOCK 150 (Cont.)

TASK LIST: Site Survey and Development (Cont.)

MINIMUM PERFORMANCE STANDARDS (CONT.):

Performs required site considerations and makes appropriate allowances or compensations.

Performs tasks within job qualification time limits.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: History of Architecture, Graphics and Art

BLOCK/COURSE NUMBER: 181 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 181, DFT 255, CAT 1121) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program
None - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide background information relative to the development of art and architecture and their interrelationships through history. To provide background information as to the periods of history as related to their primary architectural forms, their characteristics and influence on modern architecture. To provide the student with information pertaining to Twentieth Century Architectural evolution and key figures in its development. To provide the student with the basic considerations used in judging current architecture.

JOB QUALIFICATIONS GAINED: This course does not by itself provide D.O.T. identified job qualifications. Its primary function is to provide background information for the Architectural Drafting and Design Technician.

PREREQUISITES: None

PERFORMANCE EVALUATION: Performance evaluation should be task performance directed to determine if the student has, in fact, acquired the required background information.

EQUIPMENT: The student should have access to reference material that covers the architectural history periods to be discussed and that which provides information related to art, graphics and architecture and their interrelationships.

BLOCK 181 (Cont.)

TASK LIST: History of Architecture, Graphics and Art (Cont.)

Note 1: Instructors are expected to expand upon the tasks listed to ensure that necessary related information is provided on the subject area.

181.01 - State the basic concepts and philosophies that governed the development of art and its relationship to architecture.

181.02 - Explain the interrelationship of the terms "Art", "Graphics" and "Architecture".

181.03 - Know definition of the science of architecture.

181.04 - Cite examples of evidence of pre-historic architecture.

181.05 - Cite examples and state types of major structures found in Egyptian Architecture.

181.06 - Cite examples, characteristics, state types of major structures found and their influence on modern architecture of Greek Architecture.

181.07 - Cite examples, characteristics, state types of major structures found and their influence on modern architecture of Roman Architecture.

181.08 - State the characteristics of early Christian, Byzantine and Romanesque Architecture.

181.09 - State characteristics, cite examples and know influence on modern architecture of Gothic Architecture.

181.10 - State characteristics, cite examples of Renaissance Architecture.

181.11 - Know examples and describe revivals of architecture.

181.12 - Define the term and describe the influence of Electicism and Beaux Arts on modern architecture.

BLOCK 181 (Cont.)

TASK LIST: History of Architecture, Graphics and Art (Cont.)

Module .20 - Have Background Information On Twentieth Century Architecture:

181.21 - Know period covered by term Twentieth Century Architecture.

181.22 - Know influence and characteristics of design presented during the career of Frank Lloyd Wright (The Natural House).

181.23 - Know the influence and characteristics of design of other famous architects of the period such as Le Corbusier (Toward A New Architecture) and Robert Venturi.

181.24 - Define and cite examples with reference to the terms "complexity" and "contradiction" when applied to Twentieth Century Architecture and state how these terms apply to judging architecture.

181.25 - Cite examples and state characteristics of designs considered to be "new trends" in architecture.

MINIMUM PERFORMANCE STANDARDS:

The student gives evidence of knowledge of the identifying characteristics of the architectural design of each of the periods studied.

Student can cite the characteristics of design of well know architects of the Twentieth Century.

Student can state the basic concepts and philosophies that govern the development of art and its relationship to architecture.

Student can state accurately the interrelationship of "Art", "Graphics" and "Architecture".

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades)- V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Drafting and Design III (Working Drawings - Commercial Construction)

BLOCK/COURSE NUMBER: 220 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - ARC 220, DFT 220, ARC 1232) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program
99 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the preparation for, design and drawing of a complete set of working drawings for a commercial building. Develop professionalism in the neatness, consistency, placement and character in lettering techniques and drafting skills. To provide further information regarding materials and types of structural systems common to commercial construction.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification competencies required by the Architectural Drafting Technician and Building Trades Drafter.

PREREQUISITES: Instruction Equivalent to BLOCK 108 and courses prerequisite for that Block.

PERFORMANCE EVALUATION: By performance (Competency Based) testing to include the drawings prepared to meet course requirements. Test items and testing should be task performance oriented or directed to determine if the learner can, in fact, perform the required task. Performance standards should be those required to meet initial employment job performance requirements for the tasks concerned.

EQUIPMENT: Drafting equipment and reference materials normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic, this program.

BLOCK 220 (Cont.)

TASK LIST: Architectural Drafting and Design III (Working Drawings - Commercial Construction) (Cont.)

Module .10 - Know and Draw Structural Systems Common to Commercial Construction:

220.11 - Know characteristics and applications of poured and precast concrete and pan systems.

220.12 - Draw applications of poured and precast concrete and pan systems.

220.13 - Know characteristics and applications of structural steel to include connections (riveted, bolted, welded and columns) and bar joists.

220.14 - Draw various applications of structural steel.

220.15 - Know types and characteristics of roof structures and the application of thin shell concrete.

220.16 - Draw various types of roof structures used in commercial buildings.

220.17 - Know types, characteristics and applications of wall sections and the details.

220.18 - Draw various types of wall sections and applications.

220.19 - Know types, characteristics and applications of the details of minor structural features to include steel stairs, steel trusses, bearing wall details and open weld joists.

220.111 - Draw various types and applications of details of minor structural features.

BLOCK 220 (Cont.)

TASK LIST: Architectural Drafting and Design III (Working Drawings - Commercial Construction) (Cont.)

Module .20 - Draw Working Drawings of Commercial Wall Sections:

220.21 - Draw masonry wall sections for commercial construction.

220.22 - Draw panel wall sections for commercial construction.

220.23 - Draw details for wall sections for commercial construction.

Module .30 - Demonstrate Continuing Improvement In Basic Drafting Skills:

220.31 - Upgrade neatness, consistency, placement and character in lettering techniques and drafting skills.

220.32 - Demonstrate ability to use handbooks and manuals used in architectural offices.

220.33 - Demonstrate knowledge of construction materials commonly used in commercial construction.

Module .40 - Prepare Working Drawings for a Commercial Building:

220.41 - Draw working drawings for commercial site plan.

220.42 - Draw working drawings for commercial floor plans.

220.43 - Draw working drawings for commercial construction elevations.

220.44 - Draw working drawings for commercial wall sections and details.

220.45 - Draw miscellaneous details and prepare schedules for commercial building.

220.46 - Prepare miscellaneous details for commercial construction.

BLOCK 220 (Cont.)

TASK LIST: Architectural Drafting and Design III (Working Drawings - Commercial Construction) (Cont.)

MINIMUM PERFORMANCE STANDARDS:

Demonstrates knowledge of related technical information, how to use Sweets Catalogs, AIA and other technical reference material with 80% accuracy.

Produces neat, accurate and complete drawings, professional in appearance and layout.

Draws symbols and conventions appropriate for construction or construction component accurately and uses them correctly.

Performs required tasks requiring drawings within the time limits considered to be appropriate for initial employment job qualification.

Lettering and drafting skills demonstrated show neatness, accuracy, consistency, proper placement and character.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Drafting and Design IV (Working Drawings)

BLOCK/COURSE NUMBER: 221 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - ARC 221 and ARC 1233) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program
99 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the design and preparation of working drawings from a preliminary sketch of a building. To provide a learning experience in working as part of a drafting team in a simulated professional architect's office environment. To demonstrate improvement in drafting and lettering skills and techniques and knowledge of construction materials, by types, uses, characteristics and applications.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification competencies required by the Architectural Drafting Technician and Building Trades Drafter.

PREREQUISITES: Instruction Equivalent to BLOCK 220 and prerequisites for that Block.

PERFORMANCE EVALUATION: By performance (Competency Based) testing to include drawings prepared as course requirements. Test items and testing should be task performance oriented or directed to determine if the learner can, in fact, perform the required tasks. Performance standards should be those required to meet initial employment job performance requirements for the tasks concerned.

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment. See also Appendix A, Part - I Basic, this program.

Note 1: If not done previous to this course, the class should be organized, administered and supervised in such a way as to present the closest possible procedural environment to be experienced in the average professional architect's office.

BLOCK 221 (Cont.)

TASK LIST: Architectural Drafting and Design IV (Working Drawings) (Cont.)

Note 2: Instructors are expected to perform the necessary task analyses for the tasks listed and to add those which are agreed upon as needed by the local area advisory committee.

Module .10 - Demonstrate Improvement In Basic Drafting Competencies:

221.11 - Demonstrate improvement in neatness, consistency, placement and character in lettering techniques.

221.12 - Demonstrate improvement in neatness, consistency, placement and character in drafting skills.

221.13 - Demonstrate improvement in drafting competencies with emphasis on knowledge of types, uses and characteristics of materials used in different types of construction.

221.14 - Demonstrate ability to determine and use the appropriate reference materials for a drafting problem and apply problem solving process.

Module .20 - Prepare Working Drawings From a Preliminary Sketch, As Part of a Drafting Team:

221.21 - Perform necessary research for information to make working drawings for assigned project.

221.22 - Demonstrate ability to function as member of a drafting team in a professional architect's office.

221.23 - Prepare a site plan.

221.24 - Prepare a foundation plan.

221.25 - Prepare a floor plan.

221.26 - Prepare elevations.

BLOCK 221 (Cont.)

TASK LIST: Architectural Drafting and Design IV (Working Drawings) (Cont.)

Module .20 - Prepare Working Drawings From a Preliminary Sketch, As Part of a Drafting Team (Cont.):

221.27 - Prepare wall sections and details.

221.28 - Prepare schedules and details to include stairs, if appropriate.

221.29 - Prepare miscellaneous details.

221.211 - Prepare the mechanical plan.

221.212 - Prepare the structural plan.

221.213 - Prepare the electrical plan.

221.214 - Prepare the plumbing plan.

221.215 - Prepare title sheet and obtain necessary approvals.

MINIMUM PERFORMANCE STANDARDS:

Student demonstrates ability to perform as a member of a drafting team by being cooperative, performing assigned tasks, responding to instructions, practices courtesy, asks questions and gives answers when appropriate, coordinates work and obtains approvals for work accomplished.

Demonstrates improvement in lettering and drafting techniques and skills.

Demonstrates ability to use technical reference material.

Performs necessary research prior to initiating a drawing project.

Performs assigned tasks correctly and meets deadlines.

Utilizes problem solving process correctly.

Note 3: AIA recommends this phase concentrate on commercial construction.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Codes, Specifications and Contract Documents

BLOCK/COURSE NUMBER: 235 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 235 and ARC 1145) (Department of Public Instruction - Part of T&I 7563(Y-2))

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program - CC/TI
55 Hours - 1 Year Program - CC/TI
90 Hours - High School

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required to perform Architectural Drafting tasks related to -

1. Various aspects of building codes;
2. The effect of building codes in relation to construction specifications and drawings;
3. Knowledge of code definitions which apply to stairs, exits and fire ratings as defined in the State Building Code Manual;
4. The relationship between different agencies involved in administration of building codes;
5. The elements of building contracts;
6. Types of architectural contracts and the legal responsibilities involved in such contracts;
7. How to prepare building construction specifications; and
8. The contract-document analysis procedures for the purpose of fixing client-architect-contract responsibilities and duties, for mutual protection.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is a component in the development of job qualification as an Architectural Drafting Technician or a Building Trades Drafter.

PREREQUISITES: None

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference material normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic, copies of appropriate building codes, types of contracts and specifications.

BLOCK 235 (Cont.)

TASK LIST: Codes, Specifications and Contract Documents (Cont.)

Note 1: The task listing and performance standards only are provided to guide instructors/teachers and serve as a reference to ensure that standard instructional content for common courses of occupational instruction and that job qualification performance standards are applied. This will permit lateral and vertical articulation action. The individual instructor is expected to perform the necessary task analyses to determine the exact skills and related technical information that the worker requires for task performance.

Module .10 - Building Codes:

235.11 - Know the purpose of building codes.

235.12 - Know model building code primary requirements.

235.13 - Know appropriate technical society, organization, or body standards or codes.

235.14 - Know where to find general provisions of governmental codes.

Module .20 - General Provisions of Building Codes:

235.21 - Know how building codes are administered.

235.22 - Know use and occupancy provisions of building codes.

235.23 - Know building code provisions for materials, loads and stresses.

235.24 - Know miscellaneous important provisions of building codes.

235.25 - Know code requirements for building services equipment.

235.26 - Know N.C. General Statutes pertaining to the enforcement of building codes.

Module .30 - Know Elements of Contracts:

235.31 - Know classification of contracts.

235.32 - Know the essentials of a construction contract.

BLOCK 235 (Cont.)

TASK LIST: Codes, Specifications and Contract Documents (Cont.)

TASK

235.40 - Know types and normal provisions of contracts used in the construction industry to include (a) architect-owner agreements; (b) architect-engineer agreements; (c) associated architect agreements; (d) joint venture agreements; (e) owner-contractor agreements; (f) contractor-subcontractor agreements; (g) modifications to all contracts; (h) standard forms of contracts; and (i) preparation of contracts.

Module .50 - Know Contractual Division of Specification:

235.51 - Know provisions and procedures for contract advertisement.

235.52 - Know provisions for instructions to bidders.

235.53 - Know general provisions for contract proposal procedures.

235.54 - Know contract provisions for general conditions.

235.55 - Know provisions for amendments to general conditions.

235.56 - Know provisions for contract supplementary general conditions and - definition procedures for general requirements of the project.

TASK

235.60 - Know types of contract documents to include (a) contract agreements; (b) performance bonds; and (c) insurance policies.

Module .70 - Know Purpose and Content of Specifications:

235.71 - Know general contract specifications.

235.72 - Know format and outline for specifications.

235.73 - Know the outlines of typical specifications.

BLOCK 235 (Cont.)

TASK LIST: Codes, Specifications and Contract Documents (Cont.)

TASKS

235.80 - Know and be able to list the parts of contract specifications to include (a) title page; (b) table of contents; (c) contractual or bidding requirements; (d) general contract; (e) mechanical specifications (plumbing, HND's and refrigeration); (f) electrical contracts; (g) special separate contracts (food service equipment, sewage disposal, water system, site utilities, elevators/escalators, etc.); and (h) addendum (purpose and format).

235.90 - Know the formats of contract specifications to include (a) N.C.D.I.A.: and (b) Uniform systems for construction specifications.

235.91 - Know agencies responsible for building code enforcement to include (a) local; (b) state; (c) federal; (d) zoning; and (e) building inspector, health department, etc.

MINIMUM PERFORMANCE STANDARDS:

Demonstrates ability to differentiate between codes, specifications and contract documents; can state their purposes, provisions, general format, parts, administration and responsible agencies for enforcement with at least 80% accuracy.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Construction Estimating and Field Inspections

BLOCK/COURSE NUMBER: 236 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 236 and ARC 1112) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program
55 Hours - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide the student with job qualification competencies required to perform Architectural Drafting tasks involving the estimation of construction labor equipment and materials quantity surveys and costs from working drawings, plans and specifications to include:

1. Knowledge of the types of estimates and the subdivisions of estimating;
2. Knowledge of the techniques of estimating;
3. The techniques of preparing material and labor quantity surveys from plans and specifications for wood, structural steel and concrete in structures, residential buildings and highways;
4. The techniques of estimating the total costs of various jobs including labor, materials, equipment, overhead and profit;
5. Knowledge of bidding procedures and preparation of bids;
6. Knowledge of the purpose of field inspection or construction contract administration and the division of responsibility;
7. Know the requirements of the project or project representative;
8. Knowledge of the tools and equipment needed to administer the construction contract;
9. Knowledge of the content of the contract and construction documents required to administer the construction contract;
10. Know the requirements and duties for opening, running, closing and post-completion of the project;
11. Knowledge of the records, forms and reports which may be required by construction contract; and
12. Knowledge of the techniques of observing, inspecting, checking, testing materials and construction.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. Successful completion of this Block, Basic Drafting - Part I and stated prerequisites qualify the student for employment as Construction Materials Control Clerk, Construction Materials Estimator or Construction Field Inspector for general contractors.

PREREQUISITES: Instruction Equivalent to BLOCK 235.

PERFORMANCE EVALUATION: By performance (Competency Based) testing to include any drawings prepared to meet course requirements. Test items and testing should be task performance oriented or directed to determine if the learner can, in fact, perform the tasks required. Performance standards should be those required to meet initial employment requirements for the task concerned.

EQUIPMENT: Drafting equipment, reference materials, manufacturers' handbooks and like items normally found in a professional drafting environment. Copies of working drawings for the project or projects to be used as examples are also required. See also Appendix A, Part I - Basic, this program.

Module .10 - Know Types of Construction Estimates and Costs to Include:

236.11 - Purpose of estimating.

236.12 - Know types of estimates.

236.13 - Know qualifications of estimator.

236.14 - Know subdivisions of estimating.

236.15 - Know tax requirements.

236.16 - Know contractor insurance requirements.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

Module .10 - Know Types of Construction Estimates and Costs to Include (Cont.):

236.17 - Know contract surety bond purpose and requirements.

236.18 - Know sources of error.

Module .20 - Know the Techniques of Estimating to Include:

236.21 - Know bidding procedures.

236.22 - Know sequence of estimating.

236.23 - Know importance of neatness and order.

236.24 - Know contents and need for checklist of operations.

236.25 - Know how to use plans and specifications.

236.26 - Know need for and how to exaamine construction sites.

236.27 - Know how to check estimates.

Module .30 - Know How to Compute Quantities and Costs for Materials and Labor to Include:

236.31 - Know how to compute costs of construction equipment.

236.32 - Know how to compute costs of handling and transporting materials.

236.33 - Know how to compute costs of earthwork and excavation.

236.34 - Know how to compute costs of piling.

236.35 - Know how to compute costs of substructures.

236.36 - Know how to compute costs of concrete superstructures.

236.37 - Know how to compute costs of floor finishes.

236.38 - Know how to compute costs of floor systems.

236.39 - Know how to compute costs for quantity and labor for masonry.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

Module .30 - Know How to Compute Quantities and Costs for Materials and Labor to Include (Cont.):

236.311 - Know how to compute costs for quantity and labor for dampproofing and waterproofing.

236.312 - Know how to compute costs for quantity and labor for wood construction.

236.313 - Know how to compute costs for quantity and labor for lathing and plastering.

236.314 - Know how to compute costs for quantity and labor for painting.

236.315 - Know how to compute costs for quantity and labor for glazing.

236.316 - Know how to compute costs for quantity and labor for roofing and flashing.

236.317 - Know how to compute costs for quantity and labor for structural steel.

236.318 - Know how to compute costs for quantity and labor for approximate estimates.

236.319 - Know how to compute costs for quanity and labor for streets and pavements.

Module .40 - Know Field Inspection Requirements:

236.41 - Know purpose of field inspection and construction contract administration.

236.42 - Know division of responsibility of general direction or supervision.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

Module .50 - Know the Functions of Project Representative and Project Inspector:

236.51 - Know functions of project representative.

236.52 - Know functions of project inspector.

Module .60 - Know Types and Purposes of Various Contract Documents:

236.61 - Purpose of working drawings.

236.62 - Know purpose of general conditions documents.

236.63 - Know types and purposes of supplementary conditions documents.

236.64 - Know types and purposes of specifications.

236.65 - Know the types and purposes of supplementary agreements.

236.66 - Know types and purposes of insurance.

236.67 - Know types and purposes of separate contracts.

Module .70 - Know Relationship of Construction Documents to Phases of Project Operation:

236.71 - Know opening project activities and documents involved.

236.72 - Know running the project activities and documents involved.

236.73 - Know closing out the project activities and documents involved.

236.74 - Know project post-completion activities and documents involved.

Module .80 - Know Types, Contents and Purposes of Construction Records, Forms and Reports:

236.81 - Know purpose and content of project log.

236.82 - Know purpose and content of owner notification.

236.83 - Know purpose and content of order-to-proceed.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

Module .80 - Know Types, Contents and Purposes of Construction Records, Forms and Reports (Cont.):

236.84 - Know purpose and content of shop drawing log.

236.85 - Know purpose and content of shop drawing inquiry.

236.86 - Know purpose and content of shop drawing approval.

236.87 - Know purpose and content of field reports.

236.88 - Know purpose and content of change orders.

236.89 - Know purpose and content of applications for payment.

236.811 - Know purpose and content of certificates for payment.

236.812 - Know purpose and content of substantial completion report.

236.813 - Know purpose and content of acceptance of proposal.

236.814 - Know purpose and content of bidders data.

236.815 - Know purpose and content of list of subcontractors.

236.816 - Know purpose and content of receipts.

236.817 - Know purpose of job director.

236.818 - Know purpose and content of guarantee information.

236.819 - Know purpose and content of job data.

236.820 - Know purpose and content of transmittals.

236.821 - Know purpose and content of time cards.

236.822 - Know purpose and content of expense records.

236.823 - Know purpose and content of project analysis.

Module .90 - Know Purpose and Activities of Construction Observation and Phases of Observation:

236.91 - Know purpose and activities of observation before construction.

BLOCK 236 (Cont.)

TASK LIST: Construction Estimating and Field Inspections (Cont.)

Module .90 - Know Purpose and Activities of Construction Observation and Phases of Observation (Cont.):

236.92 - Know purpose and activities of observation during excavation.

236.93 - Know purpose and activities of observation during concrete work.

236.94 - Know purpose and activities of observation during framing.

236.95 - Know purpose and activities of observation during masonry work.

236.96 - Know purpose and activities of observation during mechanical installation.

236.97 - Know purpose and activities of observation during closing-in.

236.98 - Know purpose and activities of observation during finishing.

MINIMUM PERFORMANCE STANDARDS:

Student demonstrates the ability to perform 80% of the tasks within each of the modules.

Student performs the tasks listed within the time limits considered as average for initial employment qualification.

Note 1: If not done previously to this course, the class should be organized, administered and supervised in such a way as to present the closest possible procedural environment to be experienced in the average professional architect's office.

Note 2: Instructors are expected to perform the necessary task analyses for the tasks listed and to add those which are agreed upon as needed by the local area advisory committee.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Presentations I (Architectural Delineations and Models - Architectural Office Practice)

BLOCK/COURSE NUMBER: 250 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 250 and ARC 1241) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 121 Hours - 2 Year Program
None - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide job qualification competencies required by the Architectural Drafting and Design Technician to perform assigned tasks or to meet requirements for:

1. Demonstrating architectural presentation competencies.
2. Preparing a design concept presentation from a preliminary design concept sketch.
3. Knowing the organization and functions of a typical professional architect's office and the legal responsibilities in architectural practice. (Concurrent with presentation preparation.)
4. Preparing a personal employment interview portfolio.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. Successful completion of this Block and the prerequisites qualifies the student as an Architectural Delineator, Illustrator or Model Builder. It is a component in the development of job qualification competencies required by the Architectural Drafting Technician and Building Trades Drafter.

PREREQUISITES: Normally conducted in the 6th and/or 7th quarter of a 2-year program as a terminal drafting course in the 2-year program.

PERFORMANCE EVALUATION: By performance (Competency Based) testing to include drawings prepared as course requirements. Test items and testing should be task performance oriented or directed to determine if the learner can, in fact, perform the required tasks. Performance standards should be those required to meet initial employment job performance requirements of the tasks concerned.

BLOCK 250 (Cont.)

TASK LIST: Architectural Presentations I (Architectural Delineations and Models - Architectural Office Practice)

EQUIPMENT: Model making material and equipment, drafting equipment and reference materials normally found in a professional drafting environment. See also Appendix A, Part I - Basic, this program.

Module .10 - Demonstrate Presentation Preparation Competencies:

250.11 - Make photographic displays of construction sites and objects.

250.12 - Make finished sketches of architectural objects from preliminary designs.

250.13 - Arrange composition (layout) of drawings and sketches to present the subject to the best advantage to viewer.

250.14 - Letter in a professional manner.

250.15 - Know purpose of design presentations.

Module .20 - Prepare The Design Concept Presentation:

250.21 - Know the client's stated requirements and basic guidance or visualizations for proposed design.

250.22 - Determine the approach, procedures and content proposed for the design concept presentation to include (a) requirements for verbal presentation; (b) drawing requirements (site, exterior elevations, sections, perspectives or orthographic views--as appropriate for primary features, renderings of proposed design); (c) need for photographic views of site with design concept superimposed on it (projected or enlargements); (d) written descriptions as necessary; (e) need and type of model(s); and (f) ensure that primary purpose of construction is highlighted.

BLOCK 250 (Cont.)

TASK LIST: Architectural Presentations I (Architectural Delineations and Models - Architectural Office Practice)

Module .20 Prepare The Design Concept Presentation (Cont.):

250.23 - Obtain approval for presentation proposals.

250.24 - Compose plan of presentation.

250.25 - Compose narrative portion of presentation.

250.26 - Prepare necessary sketches and drawings of design concept from architect's preliminary sketch.

250.27 - Prepare required photographic components for presentation.

250.28 - Prepare model (if required) of proposed design concept.

250.29 - Rehearse presentation for approval by architect.

Module .30 - Know Professional Architect's Office Organization and Legal Responsibilities in Architectural Practice:

250.31 - Know the laws governing practice of architecture both governmental and professional associations.

250.32 - Know office procedures and relationships of architect with those connected with the construction industry.

250.33 - Know governmental agencies regulating activities involving the architect.

250.34 - Know the place of design presentations in office procedures.

Module .40 - Have Personal Portfolio for Employment Interviews:

250.41 - Know purpose of personal portfolio.

250.42 - Know desirable contents of portfolio.

250.43 - Prepare personal resume.

BLOCK 250 (Cont.)

TASK LIST: Architectural Presentations I (Architectural Delineations and
Models - Architectural Office Practice)

Module .40 - Have Personal Portfolio for Employment Interviews (Cont.):

250.44 - Prepare samples of sketching abilities.

250.45 - Prepare samples of working drawings.

250.46 - Prepare samples of photographic abilities.

250.47 - Have photographs of models prepared for presentations.

250.48 - Prepare interview plan and rehearse interview presentation.

250.49 - Obtain letters of recommendation.

MINIMUM PERFORMANCE STANDARDS:

Student demonstrates job qualification level techniques, plus knowledge of related technical information in the competencies required to make an architectural design presentation.

Student prepares and presents an architectural design presentation that is complete in content, clear in intent, accurate in factual content, that gives evidence of consideration of key elements of presentation and makes use of all appropriate media. Drawings and sketches are neat and accurate in detail.

Student can state the typical organization and responsibilities of the personnel in an architect's office and legal responsibilities of the architect in the construction industry.

Student can state the requirements, purpose and content of a drafter's personal portfolio.

Student demonstrates ability to prepare a personal portfolio that is neat, complete and professional.

Student prepares a model of the design presented, which contributes to the presentation purpose, is accurate in detail and professional in appearance.

Note 1: If not done previous to this course, the class should be organized, administered and supervised in such a way as to present the closest possible procedural environment to be experienced in the average professional architect's office.

Note 2: Instructors are expected to perform the necessary task analyses for the tasks listed and to add those which are agreed upon as needed by the local area advisory committee.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Reinforced Concrete Construction

BLOCK/COURSE NUMBER: C221 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - CIV 221) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 55 Hours - 2 Year Program*
55 Hours - 1 Year Program*

INSTRUCTIONAL OBJECTIVES: To provide special job qualification competencies useful in the performance of Architectural Drafting tasks pertaining to knowing the composition and properties of plain concrete; calculating the requirements for size and placement of reinforcing steel; and analyzing and designing reinforced concrete beams of various shapes.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is capable of providing additional and higher level competencies for qualification as a Drafter, Construction - D.O.T. Nr. 005.281-010, in the 2 Year Program.

PREREQUISITES: Strength of materials; Instructional Equivalent to Basic Drafting - Part I, BLOCKS 105, C106 and 236.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference materials normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic, this program. Field trips to reinforced concrete construction sites and/or reinforced concrete shapes fabrication plants desirable.

*Note 1: This course is a suggested drafting elective where time is available and interest exists.

BLOCK C221 (Cont.)

TASK LIST: Reinforced Concrete Construction

221.01 - Define terminologies used in reinforced concrete construction.

221.02 - Know the materials used in making concrete.

221.03 - Know the admixtures of ingredients required for different applications of concrete.

221.04 - Know the requirements and processes for curing concrete.

221.05 - Know types, requirements, characteristics and applications of concrete reinforcement.

221.06 - Calculate size and placement of reinforcement in various concrete applications.

221.07 - Know design considerations in various applications of concrete in construction.

221.08 - Know types, characteristics and procedures for bonding concrete applications.

221.09 - Know types, applications and characteristics of concrete beams.

221.10 - Analyze and design reinforced concrete beams of various shapes.

221.11 - Know characteristics, types, and applications of reinforced concrete columns.

221.12 - Be familiar with types, characteristics and applications of other common concrete structural systems.

MINIMUM PERFORMANCE STANDARDS:

Student can perform the task requirements with 80% accuracy.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Architectural Presentations II (Architectural Delineations and Models)

BLOCK/COURSE NUMBER: 1242 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - ARC 1242) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 121 Hours - 2 Year Program*
None - 1 Year Program

INSTRUCTIONAL OBJECTIVES: To provide an augmentation to the job qualification competencies required by the Architectural Drafting and Design Technician in the performance of tasks required in the preparation and presentation of architectural design presentations to a client.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It will better qualify the Architectural Drafter and Landscape Drafter to prepare for and make design presentations or to specialize in this area of activity as an Architectural Delineator, Illustrator or Model Builder.

PREREQUISITES: Instruction Equivalent to BLOCK 250

PERFORMANCE EVALUATION: By performance (Competency Based) testing to include drawings prepared as course requirements. Test items and testing should be task performance oriented or directed to determine if the learner can, in fact, perform the required tasks. Performance standards should be those required to meet initial employment job performance requirements for the tasks concerned.

EQUIPMENT: Model making material and equipment, drafting equipment and reference materials normally found in a professional drafting environment. See also Appendix A, Part I - Basic, this program.

*Note 1: This course should be considered as an elective for the 2 Year Program, where instructional time and the interest are available.

BLOCK 1242 (Cont.)

TASK LIST: Architectural Presentations II (Architectural Delineations and Models)

1242.01 - Know the client's stated requirements and basic guidance or visualization for proposed design.

1242.02 - Determine the approach, procedures and content proposed for the design concept presentation to include (a) requirements for verbal presentation; (b) drawing requirements (site, exterior elevations, sections, perspectives or orthographic views--as appropriate for primary features, renderings of proposed design); (c) need for photographic views of site with design concept superimposed on it (projected or enlargements); (d) written descriptions as necessary; (e) need and type of model(s); and (f) ensure that primary purpose of construction is highlighted.

1242.03 - Obtain approval for presentation proposals.

1242.04 - Compose plan of presentation.

1242.05 - Compose narrative portion of presentation.

1242.06 - Prepare necessary sketches and drawings of design concept from architect's preliminary sketch.

1242.07 - Prepare required photographic components for presentation.

1242.08 - Prepare model (if required) of proposed design concept.

1242.09 - Rehearse presentation for approval by architect.

MINIMUM PERFORMANCE STANDARDS:

Student prepares and presents an architectural design presentation that is complete in content, clear in intent, accurate in factual content, that gives evidence of consideration of key elements of making a presentation.

BLOCK 1242 (Cont.)

TASK LIST: Architectural Presentations II (Architectural Delineations and Models) (Cont.)

MINIMUM PERFORMANCE STANDARDS (CONT.):

Student makes use of all appropriate media in delineation and making presentation.

Drawings and sketches are neat, accurate, properly composed, lettered and professional in appearance and detail.

Student prepares model (if appropriate) of construction design being presented, which contributes to presentation purpose, is accurate in detail and professional in appearance.

ARTICULATION RESEARCH PROJECT
BLOCK/COURSE SUMMARY AND INSTRUCTIONAL OBJECTIVES

PROGRAM: Architectural Technology - T-041 (2 Year)
Drafting (Building Trades) - V-015 (1 Year)

BLOCK/COURSE TITLE: Structural Drafting (Wood, Steel and Concrete)

BLOCK/COURSE NUMBER: 230 - Includes Instructional Content Contained In Courses: (Community Colleges/Technical Institutes - DFT 230) (Department of Public Instruction - N/A)

INSTRUCTIONAL CONTACT HOURS (Recommended): 99 Hours - 2 Year Program*
99 Hours - 1 Year Program*

INSTRUCTIONAL OBJECTIVES: To provide and enhance job qualification competencies required to perform Architectural Drafting tasks involving the analysis and drawing of structural systems applications of steel, wood and concrete. This course may be considered to be an augmentation to BLOCKS 105 and C106, Architectural Materials and Methods of Construction and is therefore shown as an elective.

JOB QUALIFICATIONS GAINED: This course does not by itself provide specific D.O.T. identified job qualifications. It is capable of providing additional and higher level competencies for qualification as a Drafter, Construction - D.O.T. Nr. 005.281-010, in the 2 Year Program.

PREREQUISITES: BLOCK 220, BLOCK 105, BLOCK C106 and prerequisites for those Blocks.

PERFORMANCE EVALUATION: By performance (Competency Based) testing. Test items should be task performance oriented or directed. Performance standards should be those required to meet initial employment job performance requirements for the task concerned.

EQUIPMENT: Drafting equipment and reference materials normally found in a professional drafting environment on the job. See also Appendix A, Part I - Basic, this program.

*Note 1: This course is a suggested drafting elective, where time is available.

BLOCK 230 (Cont.)

TASK LIST: Structural Drafting (Wood, Steel and Concrete)

Module .10 - Draw and Analyze Construction Applications of Structural Steel:

230.11 - Know and draw conventional structural steel shapes.

230.12 - Know considerations in applications of structural steel.

230.13 - Know and draw common types of structural steel connections.

230.14 - Know structural steel fabrication procedures.

230.15 - Know structural steel erection requirements.

Module .20 - Draw and Analyze Construction Applications of Wood:

230.21 - Know characteristics, applications and draw heavy timber construction.

230.22 - Know characteristics and draw applications of wood in light construction.

230.23 - Know considerations to be applied in applications of wood in construction.

230.24 - Know types, characteristics, and how to draw applications of laminated wood in construction.

230.25 - Know characteristics, types, applications and draw wood connections.

230.26 - Know wood applications fabrication procedures.

230.27 - Know wood applications erection procedures.

Module .30 - Draw and Analyze Construction Applications of Concrete:

230.31 - Know types, characteristics and how to draw applications of concrete structural systems.

230.32 - Know considerations to be applied in applications of concrete structural systems.

230.33 - Know types, characteristics, applications and draw connections used in concrete structural systems.

230.34 - Know methods of fabrication of concrete structural systems.

230.35 - Know concrete structural systems erection procedures.

BLOCK 230 (Cont.)

TASK LIST: Structural Drafting (Wood, Steel and Concrete) (Cont.)

MINIMUM PERFORMANCE STANDARDS:

Student can state and apply related technical information with 80% accuracy.

Student executes drawings accurately, neatly, with professional style within job qualification performance time limits.

Student can make an analysis of the structural applications of the three primary types of structural materials with 80% accuracy.